404/26A Permit Application For The Huntsville Remedial Action Plan

At

Huntsville, Alabama

16

Prepared For

Olin Chemicals

Project T043

Contract No. SE-HV-1893-468-C

WSNCO Project No. 84182

June 1985

Waldemar S. Nelson and Company
Incorporated
Engineers and Architects

Schroder

TABLE OF CONTENTS

APPLICATION FOR

Department of the Army Permit and/or **Tennessee Valley Authority Section 26a Approval**

The Department of the Army (DA) permit program is authorized by Section 10 of the River and Harbor Act of 1899 and Section 404 of The Clean Water Act (P.L. 95-217). These laws require permits authorizing structures and work in or affecting navigable waters of the United States and the discharge of dredged or fill material into waters of the United States. Section 26a of the Tennessee Valley Authority Act, as amended, prohibits the construction, operation, or maintenance of any structure affecting navigation, flood control, or public lands or reservations across, along, or in the Tennessee River or any of its tributaries until plans for such construction, operation, and maintenance have been submitted to and approved by the Tennessee Valley Authority (TVA).

Two sets of original drawings on 8"x10-1/2" tracing paper or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings) and be submitted to the District Engineer and appropriate TVA office at the addresses listed below. An application that is not complete will be returned for additional information. Information in the application is made a matter of public record through issuance of a public notice, if warranted. Disclosure of the information requested is voluntary; however, the data requested are necessary in order to communicate with the applicant and to evaluate the application. If necessary information is not provided, the application cannot be processed nor can a permit/approval be issued.

DA and TVA Main Office	TVA District Office Location	Mailing Address
District Engineer U.S. Army Corps of Engineers Post Office Box 1070 Nashville, Tennessee 37202	Western District 202 West Blythe Street Paris, Tennessee 38242	Manager of Properties Division of Land and Forest Resources Post Office Box 280 Paris, Tennessee 38242
	Southern District 601 First Federal Building 102 South Court Street Florence, Alabama	Manager of Properties Division of Land and Forest Resources Tennessee Valley Authority Muscle Shoals, Alabama 35660
Director of Land and Forest Resources Tennessee Valley Authority Norris, Tennessee 37828	Central District 1101 Congress Parkway Athens, Tennessee	Manager of Properties Division of Land and Forest Resources Post Office Box 606 Athens, Tennessee 37303
	Eastern District 2611 West Andrew Johnson Highway Morristown, Tennessee	Manager of Properties Division of Land and Forest Resources 2611 West Andrew Johnson Highway Morristown, Tennessee 37814

Name and Address of Applicant

Olin Corporation
120 Long Ridge Road
Stamford, CT 06904

Telephone Number
Home
Office 203/356-2000

Name, Address, and Title of Authorized Agent

Mr. John M. Burns, Project Engineer
Olin Corporation
Lower River Road
Charleston, TN 37310

Telephone Number
Home
Office 615/336-4057

Location where activity exists or will occur (include Stream Name and Mile, if known)

U.S. Army, Redstone Arsenal, Huntsville, AL
Huntsville Spring Branch
River Mile 4.0 to 5.6
(See accompanying drawings)

Application submitted to

DA [X] Yes [ ] No TVA [X] Yes [ ] No

Date activity is proposed to commence February 1986

Date activity is proposed to be completed November 1988

Names, addresses, and telephone numbers of adjoining property owners, lessees, etc., whose properties also join the waterway.

Commander
United States Army Missile Command
Attn: AMSMI-XK Building 112
Redstone Arsenal, AL 35898-5000

United States Dept. of the Interior
Fish and Wildlife Service
Refuge Manager
P. O. Box 1643
Decatur, AL 35601

List of previous DA/TVA permits/approvals [ ] DA N/A (Permit Number) [ ] TVA N/A (Date)

Is any portion of the activity for which authorization is sought now complete? ☐ YES ☒ NO

If answer is "Yes" attach explanation. Month and year the activity was completed _____. Indicate the existing work on the drawings.

List all approvals or certifications required by other federal, interstate, state or local agencies for any structures, construction, discharges, deposits or other activities described in this application.

Issuing Agency	Type Approval	Identification No.	Date of Application	Date of Approval
Alabama Dept. of Env. Mgmt.	401 Certification	N/A	July 1, 1985	Pending
U.S. Fish & Wildlife Serv.	Refuge Use Permit	N/A	July 1, 1985	Pending
U.S. Army, Redstone Arsenal	Memorandum of Agreement	N/A	October 5, 1984	March 20, 1985

Has any agency denied approval for the activity described herein or for any activity directly related to the activity described herein?

☐ Yes ☒ No (If "Yes" attach explanation)

Describe in detail the proposed activity, its purpose and intended use (private, public, commercial or other) including description of the type of structures, if any to be erected on fills, or pile or float-supported platforms, the type, composition and quantity of materials to be discharged or dumped and means of conveyance, and the source of discharge or fill material. If additional space is needed, please attach additional sheets.

Olin Corporation proposes to construct a bypass channel around River Mile 5.6 to 4.0 of the Huntsville Spring Branch (HSB) located within the Wheeler National Wildlife Refuge on the U.S. Army Redstone Arsenal near Huntsville, Alabama. Additional project activities will include the filling of the bypassed channel with placement of material excavated on-site and trucked-in fill, construction of earthern diversion structures (sheet pile wall-supported), runoff diversion ditches, construction equipment access road(s), etc., all as presented in the attached project description and drawings. The Construction Sequence Schedule is also attached.

This project is mandated by the Consent Decree of May 31, 1983, entered into among Olin Corporation, the United States, and the State of Alabama. The stated purpose of the project as defined by the Consent Decree is "to isolate DDT in the Huntsville Spring Branch (HSB) - Indian Creek (IC) system from people and the environment and to minimize transport of DDT out of the HSB-IC system." Bypassing and filling the channel between HSBM 5.6 to HSBM 4.0 effectively isolates approximately seventy-five (75%) percent of the DDT in the channels and overbanks of the HSB-IC system and reduces the DDT transport by greater than ninety-five (95%) percent. The basic project components for the Remedial Action Plan were unanimously approved on August 31, 1984 by members of the Review Panel, which was established by the Consent Decree and consists of appointed voting delegates from the U.S. Environmental Protection Agency, the U.S. Army, the Tennessee Valley Authority, the State of Alabama (Department of

Application is hereby made for approval of the activities described herein. I certify that I am familiar with the information contained in this application, and that to the best of my knowledge and belief such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities.

June 28, 1985
(Date)

John M. Burns
Signature of Applicant or Authorized Agent

The application must be signed by the applicant; however, it may be signed by a duly authorized agent if this form is accompanied by a statement by the applicant designating the agent and agreeing to furnish upon request, supplemental information in support of the application.

18 U. S. C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of The United States knowingly and willfully falsifies, conceals, or covers up by any trick scheme, or device a material fact of makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both. Do not send a permit processing fee with this application. The appropriate DA fee will be assessed when a permit is issued.

Environmental Management and the U.S. Fish and Wildlife Service. Nonvoting members of the Review Panel include a representative from the town of Triana, Alabama and a representative from Olin Corporation.

B. PROJECT DESCRIPTION

The central element of Olin's Remedial Action Plan is a diversion of the Huntsville Spring Branch (HSB) around the contaminated channel between HSBM 5.6 and 4.0. The alignment of this diversion channel is through an existing side channel which will be deepened by hydraulic excavation (hereinafter referred to as the "Loop") and 1,640 feet of excavated channel (hereinafter referred to as the "Salient Cut") to an existing embayment. Primary project components include:

1) the blocking-off and filling of the present HSB channel from HSBM 5.6 to 4.0, the west portion of the Loop, and the small embayment at HSBM 4.2;

2) construction of access roads and bridges;

3) improvement of the Loop channel and excavation of the Salient Cut;

4) three diversion structures with No. 1 at HSBM 5.6, No. 2 at the western portion of the Loop, and No. 3 at HSBM 4.0. There will also be a Diversion Levee from HSBM 4.0 to 4.2;

5) a Northern Staging Area for storage of fill brought in from

off-site and for placement of construction trailers, project offices, equipment washing, etc.

6) a Northern Diversion Ditch;

7) a Wastewater Diversion Ditch;

8) a Fill Dewatering Area for storage and dewatering of material hydraulically excavated from the Loop channel; and

9) a Dredge Staging and Launch Area.

Each of these components is described below (not in construction sequence):

1) <u>Blocking-off and filling the present channel from HSBM 5.6 to 4.0, a portion of the Western Loop, and the small embayment at HSBM 4.2</u>

Diversion structures as described in Section 4 below will be constructed at HSBM 5.6 and 4.0 and the Western Loop. The existing channels will be cleared of vegetation sixty (60) feet wide along the left descending bank and fifty (50) feet wide along the right descending bank. The blocked channel will then be dewatered in segments by placement of intermediate dikes across the channel and pumpage of the isolated section to be filled into the next downstream section. Small depressions will be excavated in the lowest area of each section to be dewatered to assist in pumping as dry as possible. Material excavated will remain

in the section being dewatered. The actual number of channel sections will be determined in the field. After section dewatering, the overbank areas (25′ wide by 1.5′ deep) on each side of the Huntsville Spring Branch will be pushed by bulldozer into the channel. A layer of crushed rock approximately nine (9) or more inches thick on geotextile fabric will then be installed over the overbank material. Following installation of the crushed rock, covering of the channel will continue utilizing the excavated material from the Loop and Salient Cut previously stockpiled in the Fill Dewatering Area. The channel will then be covered with at least three (3) inches of off-site top soil, graded and sloped to prevent ponding. Finally, the off-site topsoil will be seeded with a mixture of Alta fescue and Bermuda grass to minimize erosion. Construction sequence sections are shown in Drawings R19 and R20.

2) Construction of access roads and bridges

Construction of access roads will be required due to the nature of the soils throughout the project area. Access Road C, approximately 5948 feet long, will provide access for excavation of the Wastewater Diversion Ditch, construction of Diversion Structure No. 1 at HSBM 5.6, improvement of the Loop channel, construction of Diversion Structure No. 2 in the West Loop, and excavation of the Salient Cut. This access road will terminate at the embayment and will require the installation of bridges across the HSB channel at HSBM 5.6 (No. 1) and the Western Loop (No. 2). Top elevation of

this road will be at 560 feet MSL or two feet above existing grade, and will allow access during most water conditions. The normal high pool elevation of Wheeler Reservoir is 556 feet MSL. Riprap will be placed on the water side of the access road adjacent to the new channel to minimize bank erosion. Cross sections are shown on Drawing R10 (Wastewater Diversion Ditch area), R17 (Salient Cut area), and R18 (Loop area).

Access road F, located north and east of and adjacent to the Northern Diversion Ditch will be approximately 5810 feet long and will provide access for construction of this ditch, construction of Diversion Structure No. 3 at HSBM 4.0, and any filling operations at the west end of the project, including the embayment at HSBM 4.2. A cross section of this road is shown in Drawing R9.

Access roads D and E will be located west of and adjacent to the west portion of the Loop section to be filled and south of and adjacent to the channel between HSBM 5.6 and 4.0. These access roads are approximately 9430 feet long and will serve the filling operations along the HSB and the West Loop. The cross sections are shown in Drawings R18 and R19.

Present gravel roads in the project area such as the one leading to the North Staging Area (Road A), the one parallel to the existing wastewater ditch (Road B), and the present road leading to HSBM 5.0 (Road A) will be widened to 28 feet, shoulder-to-

shoulder, and improved to facilitate construction traffic to and from the project site.

The two construction bridges to be installed at HSBM 5.6 (Drawing R7) and the West Loop (Drawing R8) will be 28 feet wide. The bridges at HSBM 5.6 and the West Loop are 120 feet and 105 feet long, respectively. Upon completion of construction of the access road and prior to filling the channel immediately under the bridges, the bridge decks and guard rails will be permanently removed. Bridge pilings and pile bents will be cut off at ground level.

3) Improvement of the Loop channel and excavation of Salient Cut

Excavation of the diversion channel will be conducted in two phases and prior to construction of any of the diversion structures. The initial phase will be the excavation of the 1,640-foot-long Salient Cut. This excavation will be performed by machine (e.g., dragline, backhoe, etc.) in segments leaving soil plugs at intervals and each end to facilitate dewatering, if required. Excavated material (approximately 37,000 cubic yards) from the Salient Cut will be hauled to the Fill Dewatering Area and used to construct the perimeter and interior levees. This material will eventually be used as fill in the HSB. If additional material is required, off-site fill will be provided.

The second phase will be the 4005-foot-long Loop channel improvement. This excavation will be performed by small hydraulic dredge (14") commencing excavation at HSBM 5.6 after being launched in the HSB at Patton Road. The hydraulically excavated material (approximately 40,000 cubic yards) will be pumped to the Fill Dewatering Area and allowed to dry until suitable for fill.

4) Diversion structures

Three diversion structures are required for the Remedial Action Plan and will be located at HSBM 5.6 (Structure No. 1), the Western Loop (Structure No. 2), and HSBM 4.0 (Structure No. 3). All will be of riprap construction with a center core of single wall steel sheetpiles driven to refusal. Top elevation of diversion structures will be 561 feet MSL. Lengths of the diversion structures at elevation 561′ MSL are 550′, 405′, and 131′ for the structures at HSBM 5.6, Western Loop, and HSBM 4.0, respectively. Plans and section views of the three are shown in the attached permit drawings R11 through R14.

There is also a Diversion Levee extending between HSBM 4.2 and 4.0 on the eastern side of the channel and tied into Diversion Structure No. 3 at HSBM 4.0. This Diversion Levee will serve to divert high stage flows from the embayment into the HSB channel and prevent scour behind the HSBM 4.0 diversion structure. A drainage swale will be installed west of Diversion Structure No. 3 which will prevent ponding of water behind this structure and

along the HSB. Plan and section views of the Diversion Levee are shown in Drawings R13 and R14, respectively.

5) North Staging area

The North Staging Area will occupy approximately five acres and will be the site of the main project office, construction trailers, equipment washdown station, vehicle maintenance slab, fuel storage area, and other temporary construction facilities. These offices will require telephones, electrical power, potable water, sanitary wastewater services, refuse pick-up, fire protection, etc. The North Staging Area will serve as the material stockpile area and distribution point for all off-site materials such as crushed rock, riprap, fill, and topsoil. The northern portion of this site is outside of the Wheeler National Wildlife Refuge. Clearing and grading of the site will be required. Upon completion of construction activities, this area will be seeded with the grasses previously mentioned. A plan view of the staging area is shown in Drawing R15.

Trucks and other equipment which have been in the contaminated overbank areas and streambed will be washed prior to leaving the project site. Wash water will be recycled for reuse with dirt allowed to settle in a sump. Accumulated dirt will be deposited in a dewatered section of the HSB channel.

6) Northern Diversion Ditch

A diversion ditch and access road will be constructed north of the bypassed HSB channel to divert area drainage that would enter the channel from the north and west. The ditch will originate south of the road adjacent to the North Staging Area and will discharge downstream from Diversion Structure No. 3 at HSBM 4.0. The ditch will be 6027 feet long (Drawing R9). Excavated material will be used as roadbed material for the adjacent access road or as fill in the HSBM 4.2 embayment. The side slopes of the North Diversion Ditch will be seeded with a mixture of Alta fescue and Bermuda Grass.

7) Wastewater Diversion Ditch

The ditch draining the area occupied by the former DDT plant (referred to herein as the Wastewater Ditch) will be diverted to a point upstream of Diversion Structure No. 1 at HSBM 5.6. The new ditch will also collect runoff from those areas north and east of the ditch. A typical cross section of this new ditch is shown in Drawing R10. This ditch, approximately 1280′ long will begin at a point approximately 785 feet north of the present ditch discharge. A 90-foot-long culvert will be installed where the new access road crosses the existing ditch to allow flow to continue to the present discharge point until the diversion is completed. The side slopes of the new Wastewater Diversion Ditch will be seeded with a mixture of Alta fescue and Bermuda grass. Completion of the Wastewater Diversion Ditch will require excavation of

approximately 4349 cubic yards of material. The excavated material will be stockpiled at the North Staging Area or alongside the new access road for later use in filling the existing wastewater ditch and for other filling operations.

8) Fill Dewatering Area

The material hydraulically excavated from the Loop channel with a 14-inch dredge will be pumped to a 28.6-acre (1021′ x 1221′) Fill Dewatering Area located north of the Salient Cut, which will have been previously cleared and graded (Drawing R16). The area to be cleared equals 30.6 acres. This area will provide for solids settling and dewatering of the excavated material from the Loop. It will be baffled with interior earthen dikes to increase the length-to-width ratio and prevent hydraulic short-circuiting through the basin.

Supernatant water from the Fill Dewatering Area will overflow a weir (spillbox) and enter the existing West Loop Area. It is estimated that influent water from the dredging operation will average 10 percent solids (100 grams/liter) and the solids in the overflow will range between one and two grams/liter. Duration and frequency of the dredging operation in the Loop and operation of the adjustable overflow weirs in the Fill Dewatering Area will minimize solids carryover through the basin. The Fill Dewatering Area has been designed to provide for an estimated 116-hour retention at initiation of dredging in the Loop and for an estimated

18 hours as the dredging operation is nearing completion. These estimated retention times are for continuous dredging operations and can be lengthened by intermittant dredge operation.

Upon completion of dredging, the retained supernatant water in the Fill Dewatering Area will be gradually released by lowering the adjustable overflow weirs. The material will then be furrowed to effect further dewatering. After removal of the material, the entire area will be seeded with the grasses previously mentioned.

9) Dredge Staging and Launch Area

There will be a small staging area (100′ x 200′ maximum) on the Huntsville Spring Branch at Patton Road (HSBM 5.9) which will be used for assembly and launching of the hydraulic excavation equipment. Minimal clearing, if any, will be required and the area will be seeded where necessary with the grasses previously mentioned.

C. HYDRAULIC CONSIDERATIONS

The HSB diversion channel through the Loop and Salient Cut is designed to handle a nominal flow of 250 cubic feet per second (cfs) within the banks. Comparative modeling of the existing HSB channel and the proposed diversion was done with the HEC-2 "Water Surface Profile Program" as developed by the Hydrologic Engineering Center of the U.S. Army Corps of Engineers (Version-November 1976, updated March 1982). Results of this modeling indicate that the proposed channel diversion will offer better hydraulics

because:

1) Alignment is straightened out and channel bottlenecks are eliminated.

2) Channel banks will offer less friction loss.

3) Cross sectional flow area has been increased.

4) Use of embayment area (open waterway).

5) Area of new cut exceeds that of the channel at HSBM 2.72 which is now the restricting point of the stream.

The new channel was compared under a variety of flow conditions and pool stages to the existing HSB channel between HSBM 5.6 to 4.0. Actual existing channel cross sections as determined by field survey at 200′ intervals were utilized in the hydraulic comparison. The Corps of Engineers developed HEC-2 program mentioned previously was the hydraulic model selected for use. The water stage elevation at HSBM 5.6 was used as the reference backwater point for all flow and existing versus new channel comparisons.

Flow conditions tested were 250 CFS, 600 CFS, and 9,250 CFS (10-year flood flow). Each of these flows were tested at both high and low pool stages which are 556′ and 552′ MSL at base stage, respectively, within the project area at HSBM 5.0. Respective stages at HSBM 4.0 at the flow conditions tested were determined by extrapolation between known stage-discharge relationships at HSBM 5.0 and 2.4. The following table exhibits the results of the hydraulic modeling.

RESULTS OF HYDRAULIC MODELING

EXISTING CHANNEL (HSBM 5.6 to 4.0)	ELEVATION (FEET MSL) HSBM 4.0 High Pool	HSBM 4.0 Low Pool	HSBM 5.6 High Pool	HSBM 5.6 Low Pool
Flow = 250 CFS	556.5	554.4	558.4	558.3
Flow = 600 CFS	557.1	556.0	558.3	558.2
Flow = 9,250 CFS (10-year flood)	565.2	565.2	565.6	565.6
NEW CHANNEL - Loop and Salient Cut (HSBM 5.6 to 4.0, Through Embayment)				
Flow = 250 CFS	556.5	554.4	556.8	555.4
Flow = 600 CFS	557.1	556.0	558.0	558.1
Flow = 9,250 CFS	565.2	565.2	565.5	565.5

As can be seen from this table, the new channel presents a better hydraulic route between HSBM 5.6 to 4.0. In all flow cases tested, the resultant stage elevation at HSBM 5.6 was lower for the new channel than for the existing. As expected, the most significant decrease in stage was at a flow case of 250 CFS (within bank flow) having a 1.6 feet and 2.9 feet

lowering under high pool and low pool conditions, respectively.

D. PROJECT EFFECTS ON TVA FLOOD AND POWER POOL

1. Power Pool (elevation 550′ to 556′) = -3 acre-feet (net loss)

2. Flood Pool (elevation 550′ to 579′) = -69 acre-feet (net loss)

E. CONSTRUCTION SCHEDULE

The construction schedule shown on Exhibit 1 is designed to take advantage of low water conditions (historical records from gaging station HSBM 5.0) for construction of access roads and diversion structures. Water levels are typically lowest during the months of August, September, and October and highest during March, April, and May.

F. WETLAND AND UPLAND VEGETATION IMPACTS

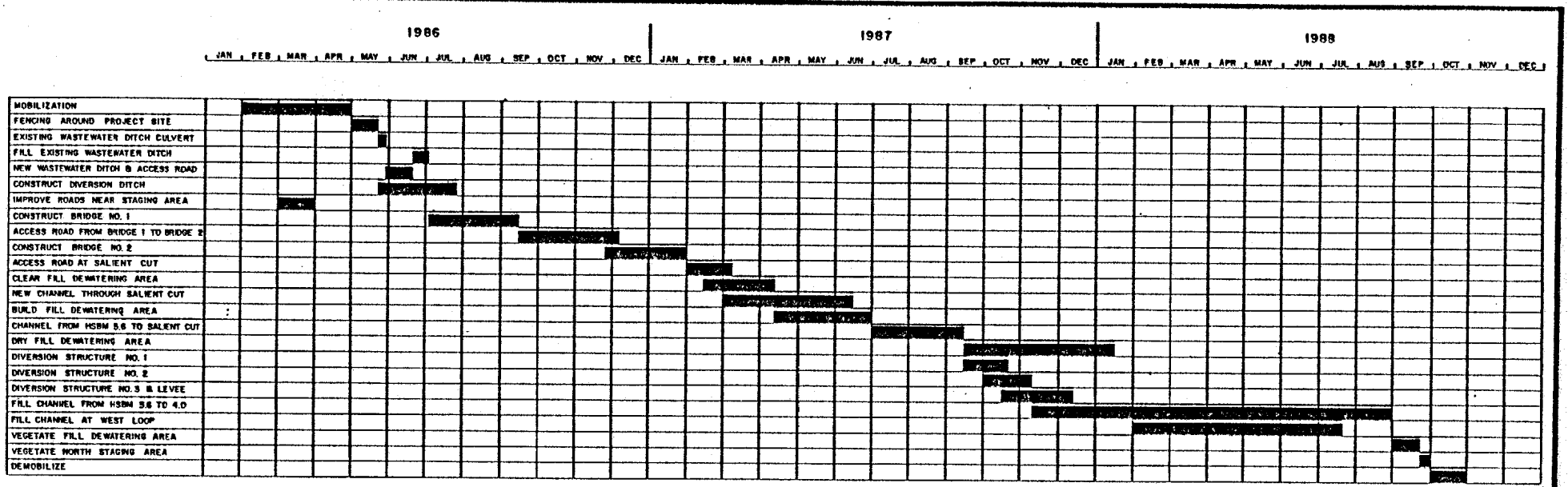
WETLANDS

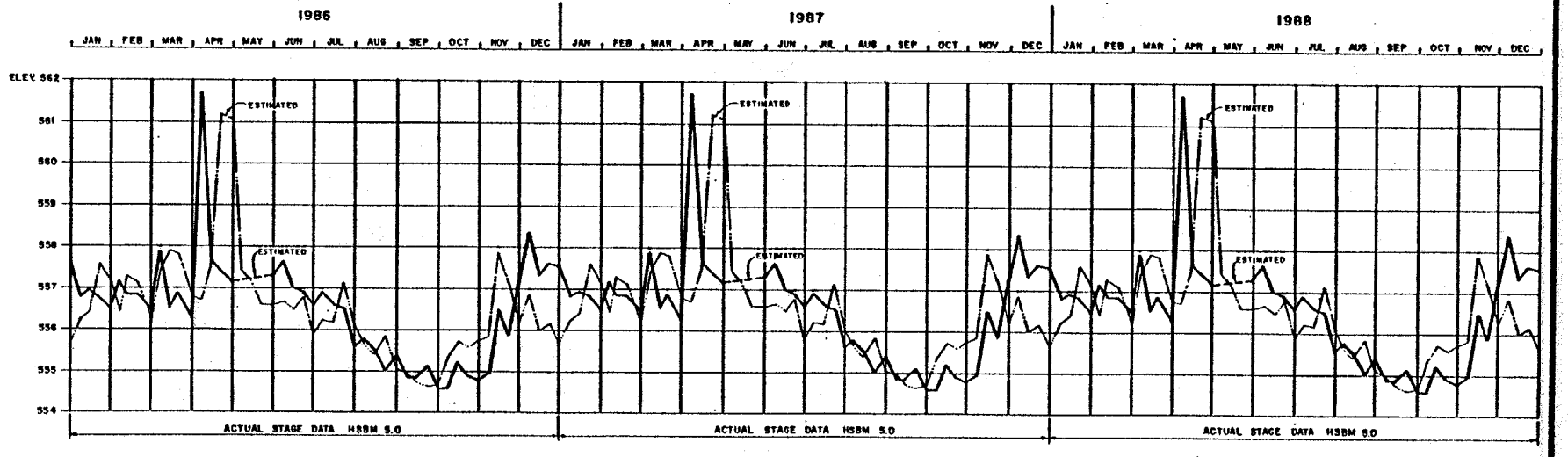
1. Wetlands Lost = 9.6 acres
2. Wetlands Modified Permanently (one type to another) = 36.1 acres
3. Wetlands Modified Temporarily = 56.5 acres

UPLANDS

1. Upland Vegetation Lost = 5.3 acres
2. Upland Vegetation Modified Temporarily = 6.0 acres

DETAILED BREAKDOWN OF WETLAND AND UPLAND VEGETATION IMPACTS





LEGEND:

——— 1/85 TO 1/84

——·—— 1/84 TO 1/85

Olin

HUNTSVILLE REMEDIAL ACTION PLAN

WALDEMAR S. NELSON AND COMPANY, INCORPORATED
ENGINEERS AND ARCHITECTS
1100 ST. CHARLES AVE. NEW ORLEANS, LA.

EXHIBIT 1

CONSTRUCTION SCHEDULE

SCALE: NONE

WETLANDS

1. Wetlands Lost

A. Access Roads

1. Along North Diversion Ditch (only 2800′ of the 5810′ road is through wetlands)

40′ x 2800′ = 2.57 acres

2. Along Wastewater Diversion Ditch to HSBM 5.6, to West Loop, along Salient Cut

40′ x 5208′ = 4.78 acres

B. Diversion Structures

1. At HSBM 5.6 (Structure No. 1)

Area = 0.99 acres

2. At West Loop (Structure No. 2)

Area = 0.48 acres

3. At HSBM 4.0 (Structure No. 3)

Area = 0.15 acres

4. Diversion Levee at HSBM 4.2 to 4.0

Area = 0.65 acres

2. Wetlands Modified Permanently

A. Open Water to Deeper Open Water

1. Excavation of Loop

80′ x 4005′ = 7.36 acres

B. Open water to wetlands vegetation

1. Filling of West Loop

285′ x 1425′ = 9.32 acres

2. Filling of HSB

60′ x 8440′ = 11.62 acres

3. Filling of HSBM 4.2 Embayment

110′ x 1,050′ = 2.65 acres

C. Wetlands Vegetation to Open Water

1. Excavation of Salient Cut

90′ x 1640′ = 3.39 acres

2. Excavation of Wastewater Diversion Ditch

30′ x 360 ′ = 0.25 acres

3. Excavation of Northern Diversion Ditch (only 3255′ of the 6027′ Ditch is through wetlands)

20′ x 3255′ = 1.49 acres

3. Wetlands Temporarily Modified

A. Clearing

1. Fill Dewatering Area

   Cleared Area = 30.6 acres

2. Along HSB and Western Loop

   110′ x 9865′ = 24.91 acres

3. Clearing between Northern Diversion Ditch and Access Road F

   15′(avg.) x 2800′ = 0.96 acres

UPLANDS MODIFIED

1. Uplands Lost

   A. Access Roads

      1. Along Northern Diversion Ditch

         40′ x 3,010′ = 2.76 acres

      2. Along Wastewater Diversion Ditch

         40′ x 740′ = 0.68 acres

   B. Excavation

      1. Northern Diversion Ditch

         20′ x 2772′ = 1.27 acres

      2. Wastewater Diversion Ditch

         30′ x 920′ = 0.63 acres

2. Uplands Temporarily Modified

A. Clearing

1. North Staging Area = 5.0 acres

2. Clearing between Northern Diversion Ditch and Access Road F

15′(avg.) x 3010′ = 1.04 acres

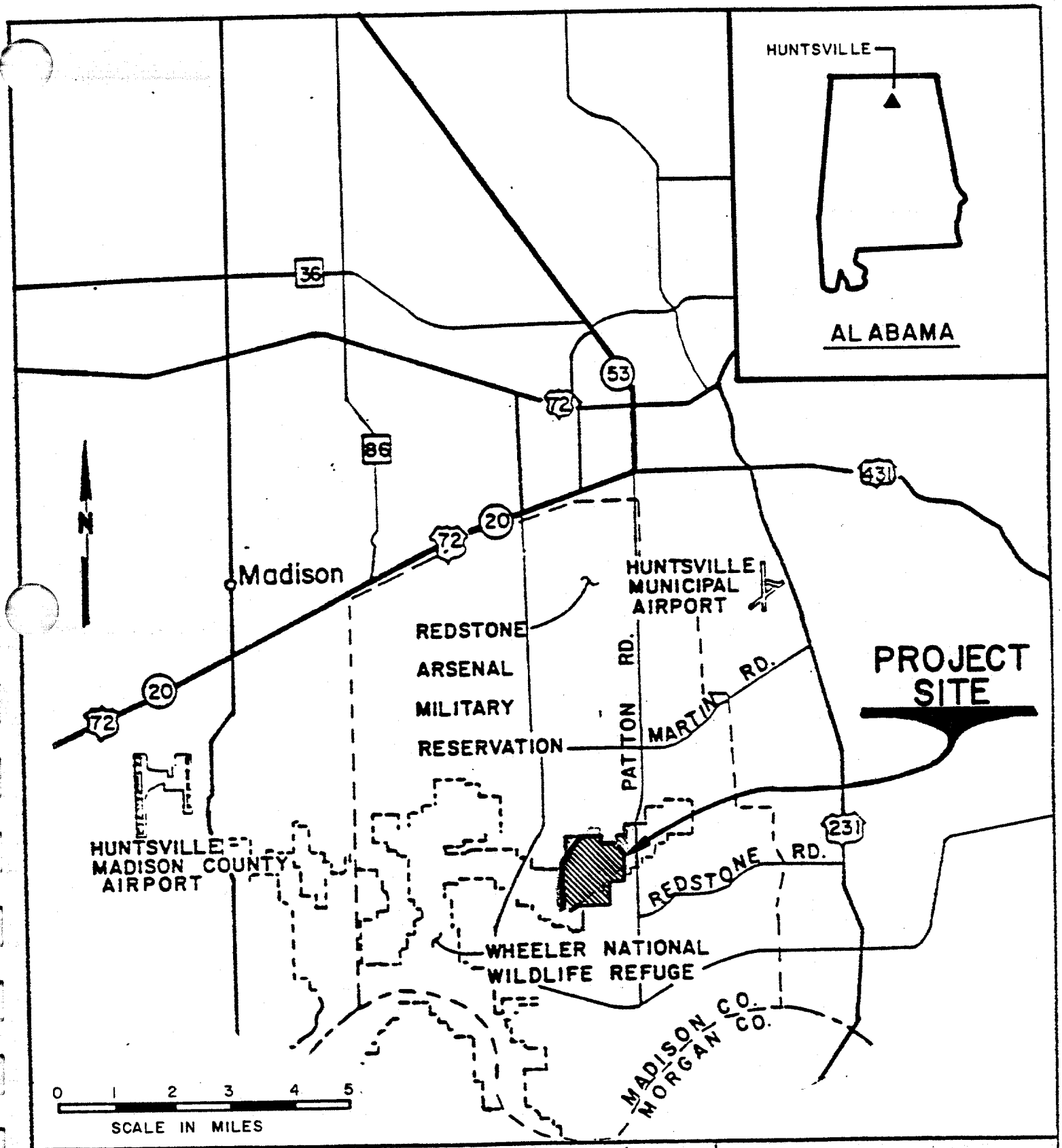
G. CUT AND FILL QUANTITIES

	ACTIVITY	SOIL CUT (cy)	SOIL FILL (cy)	ROCK FILL (cy)
1.	Loop & Salient Channel	77,802	-	5,543
2.	Existing Wastewater Ditch	-	1,188	-
3.	Wastewater Diversion Ditch	4,349	-	453
4.	Northern Diversion Ditch	14,535	-	2,677
5.	HSB Channel	27,310	91,975	24,277
6.	West Loop	-	32,818	7,854
7.	Diversion Structure No. 1	-	4,456	4,216
8.	Diversion Structure No. 2	-	-	4,402
9.	Diversion Structure No. 3	-	-	6,368
10.	Loop & Salient Road (C)	-	-	14,201
11.	Northern Diversion Ditch Road (F)	-	5,566	6,544
12.	West Loop Road (D)	-	-	1,636
13.	HSB Road (D and E)	-	-	9,191
14.	Wastewater Diversion Ditch Road (C)	-	-	1,180
15.	HSBM 4.2 Embayment	-	2,035	-
16.	North Staging Area	-	-	4,033
17.	Improvement of Existing Access Roads (A and B)	-	1,115	3,344
18.	Ditch Near HSBM 4.0	-	332	-
19.	Fill Around Wastewater Diversion Ditch Culvert	-	154	-

20. Bridge No. 1	-	-	197
21. Bridge No. 2	-	-	197
	123,996	139,639	96,313

Soil From Offsite Source = 15,643 cy
Rock From Offsite Source = 96,313 cy

H. PERMIT APPLICATION DRAWINGS (Attached)



FOR PERMIT APPLICATION

Olin

HUNTSVILLE, ALABAMA
REMEDIAL ACTION PLAN
VICINITY MAP

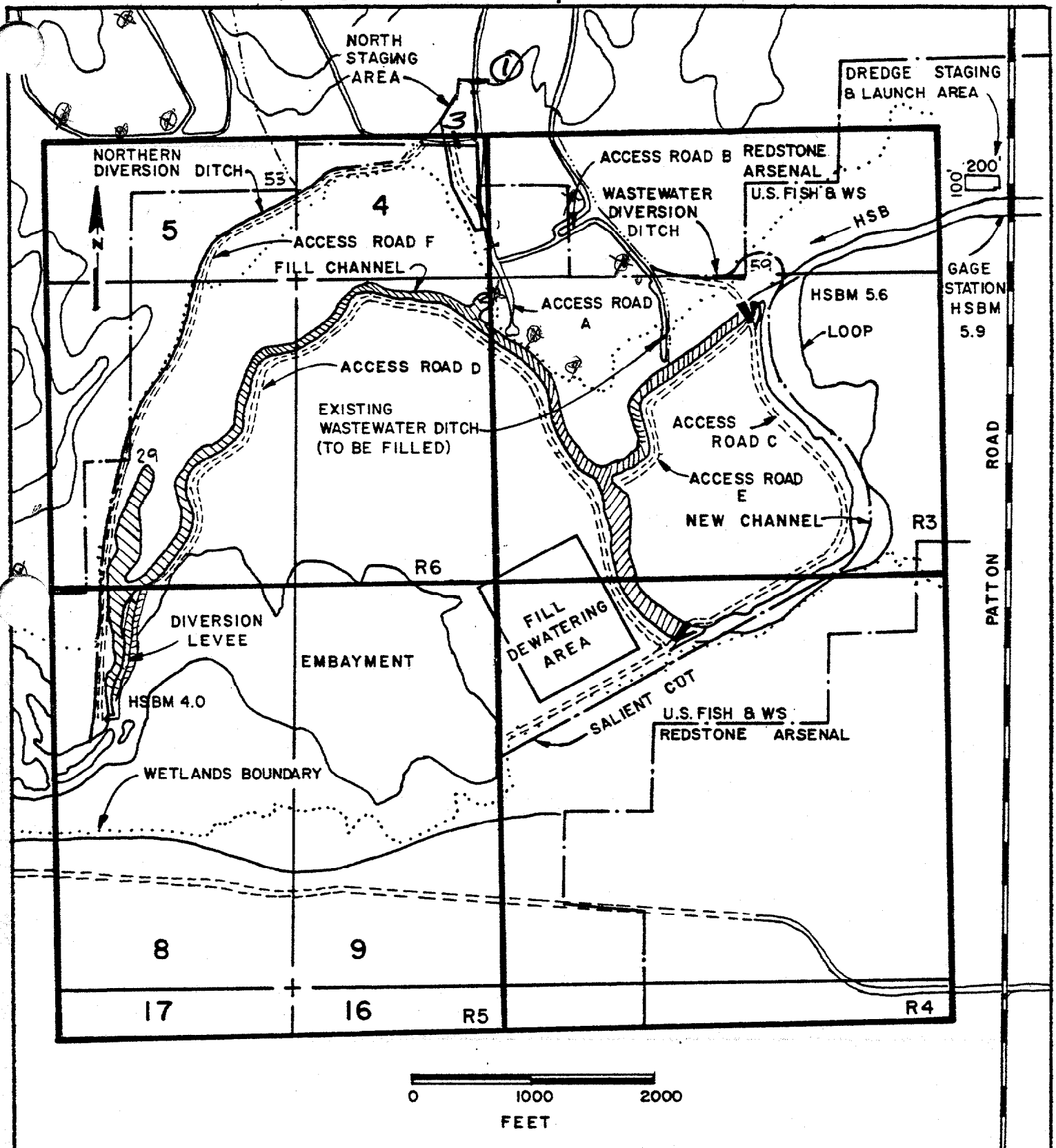
WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

DRAWN BY S.V.N.	DATE 4-16-85
CHECKED BY ARO	DATE 4-18-85
APP. BY	DATE
APP. BY	DATE

DWG. RI OF 20

REV. P1

TOWNSHIP 5 SOUTH, RANGE 1 WEST



FOR PERMIT APPLICATION

WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

Olin

HUNTSVILLE, ALABAMA

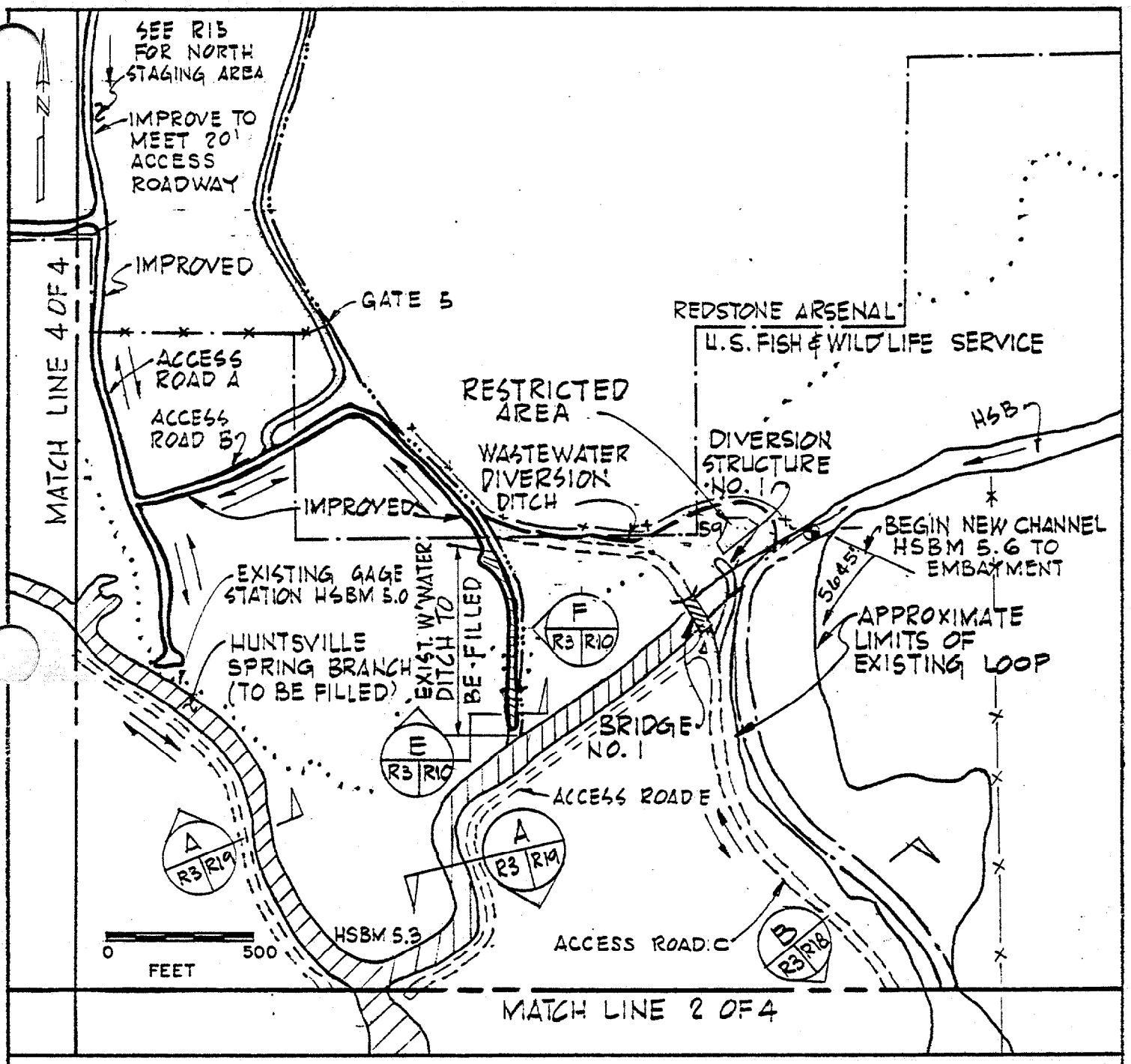
REMEDIAL ACTION PLAN

LOCATION PLAN

DRAWN BY S.V.N.	DATE 4-16-85
CHECKED BY AFO	DATE 4.18.85
APP. BY	DATE
APP. BY	DATE

DWG. R2 OF 20

REV. P2



FOR PERMIT APPLICATION

WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

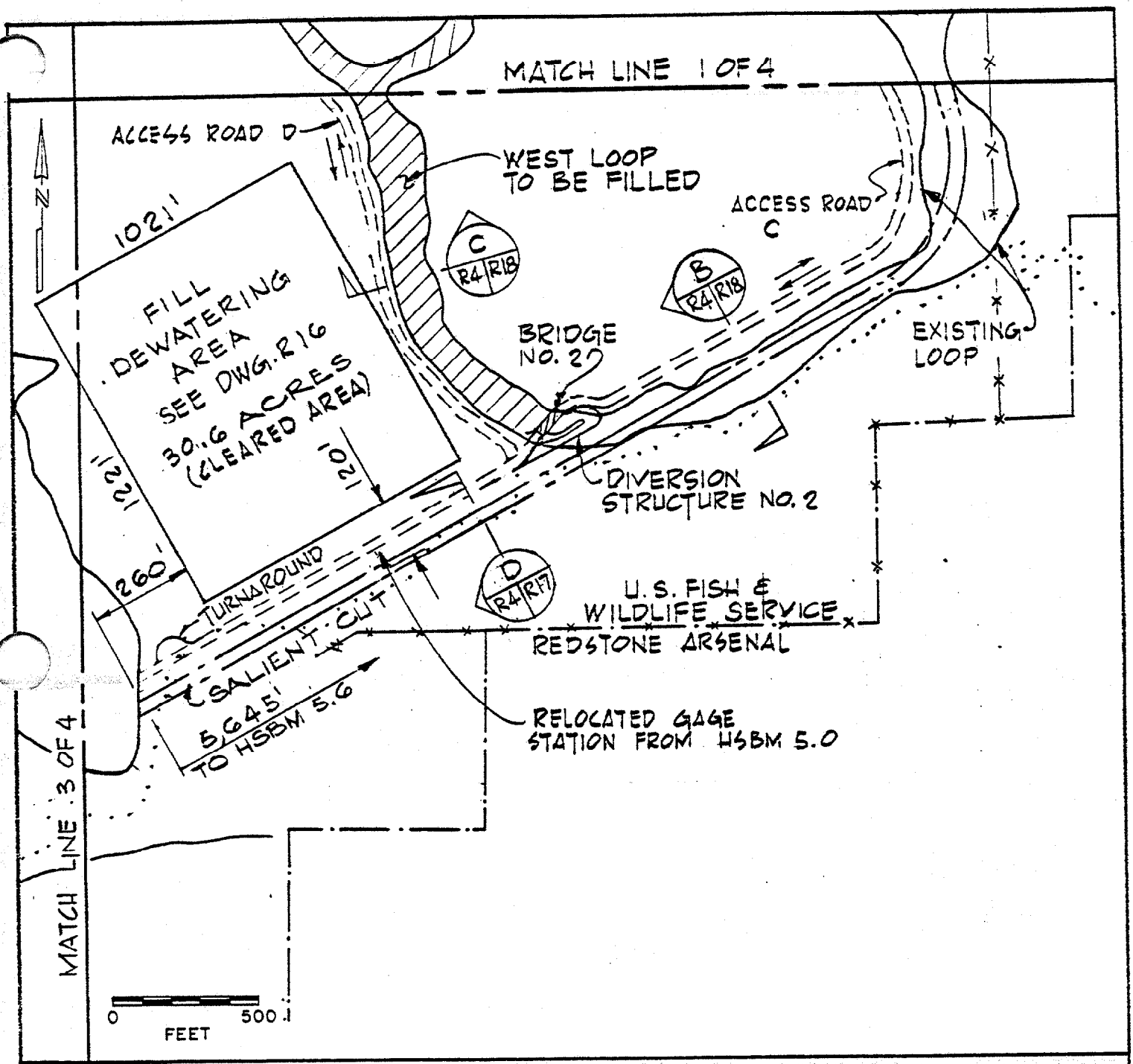
Olin

HUNTSVILLE, ALABAMA
REMEDIAL ACTION PLAN

CONSTRUCTION FEATURES 1 OF 4

DRAWN BY S. V. N.	DATE 12-26-84	
CHECKED BY APO	DATE 2-1-85	
APP. BY	DATE	
APP. BY	DATE	

DWG. R3 OF 20 REV. P2



EXISTING ROAD
PROPOSED ROAD
EXISTING DITCH
PROPOSED DITCH
TWO WAY TRAFFIC
ACCESS BRIDGE
NEW CHANNEL
WETLAND BOUNDARY
U.S. FISH & WILDLIFE SERVICE BOUNDARY
PROJECT BOUNDARY (FENCE LINE)

FOR PERMIT APPLICATION

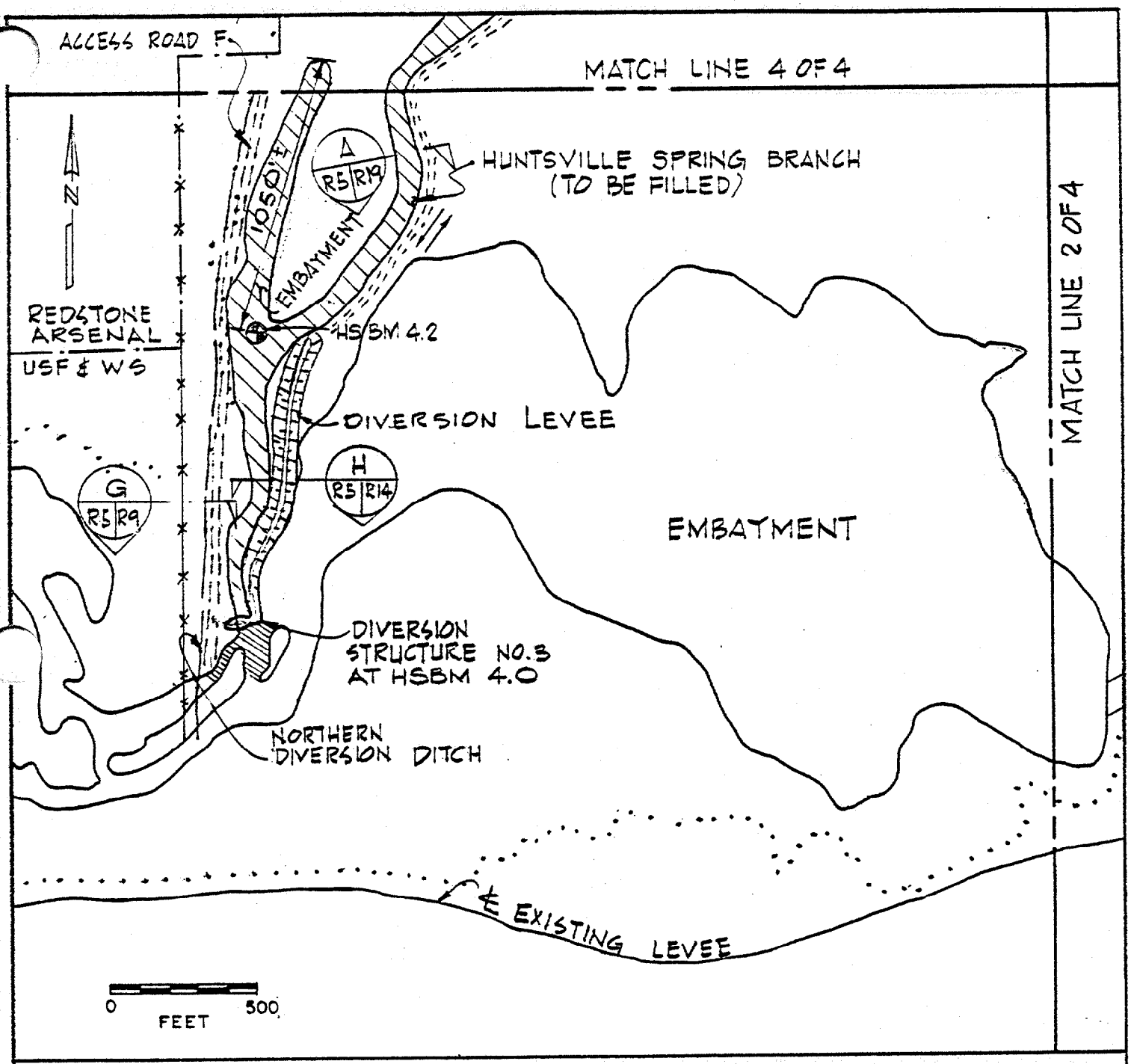
WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

Olin

HUNTSVILLE, ALABAMA
REMEDIAL ACTION PLAN

CONSTRUCTION FEATURES 2 OF 4

DRAWN BY S. V. N.	DATE 12-26-84	
CHECKED BY APO	DATE 2-1-85	DWG. R4 OF 20
APP. BY	DATE	REV. P3
APP. BY	DATE	



EXISTING ROAD
PROPOSED ROAD
EXISTING DITCH
PROPOSED DITCH
TWO WAY TRAFFIC
ACCESS BRIDGE
NEW CHANNEL
WETLAND BOUNDARY
U.S. FISH & WILDLIFE SERVICE BOUNDARY
PROJECT BOUNDARY (FENCE LINE)

FOR PERMIT APPLICATION

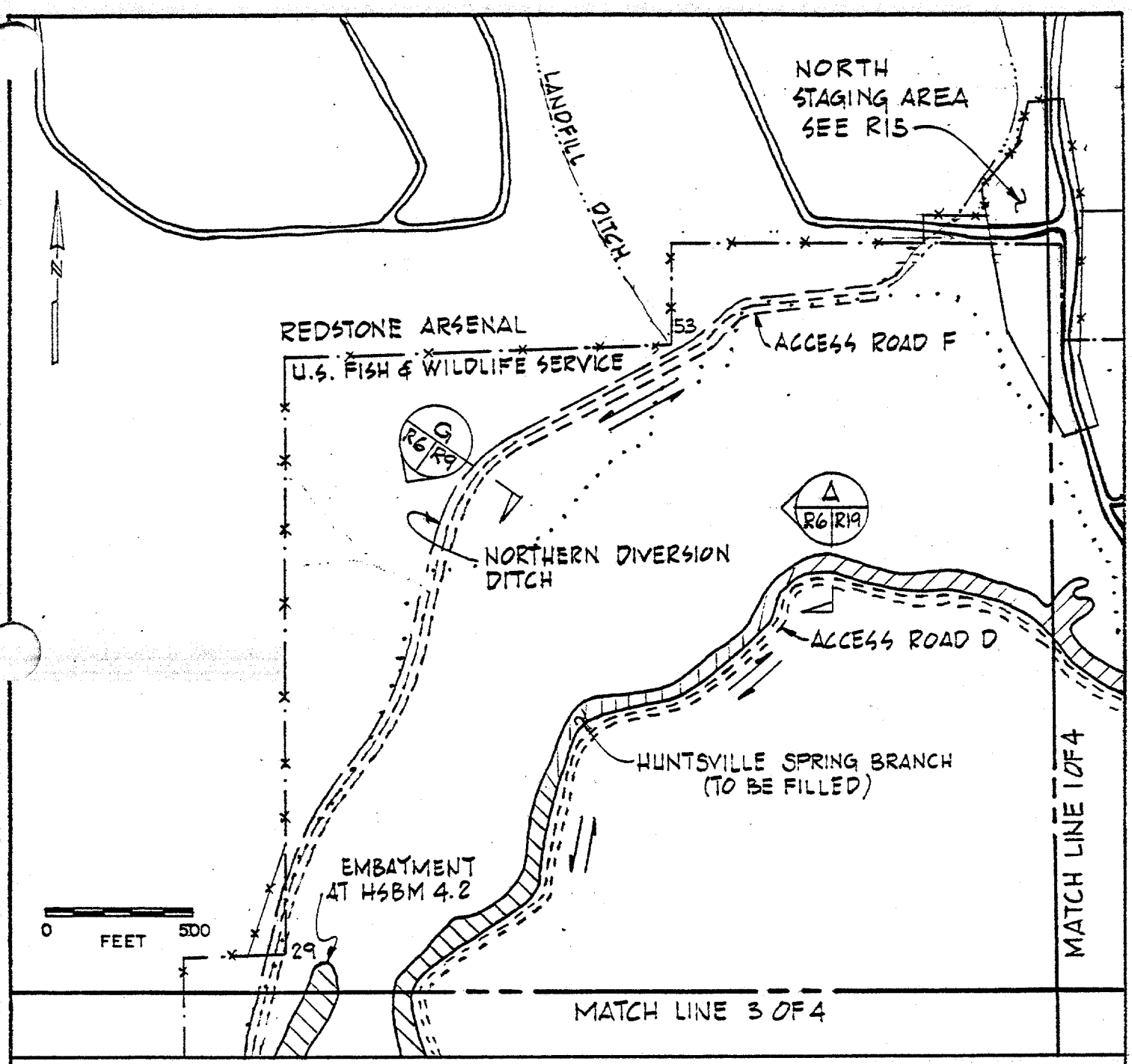
WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

Olin

HUNTSVILLE, ALABAMA
REMEDIAL ACTION PLAN

CONSTRUCTION FEATURES 3 OF 4

DRAWN BY S. V. N.	DATE 12-26-84	
CHECKED BY FDO	DATE 2-1-85	DWG. R.5 OF 20
APP. BY	DATE	REV. PB
APP. BY	DATE	



EXISTING ROAD
PROPOSED ROAD
EXISTING DITCH
PROPOSED DITCH
TWO WAY TRAFFIC
ACCESS BRIDGE
NEW CHANNEL
WETLAND BOUNDARY
U.S. FISH & WILDLIFE SERVICE BOUNDARY
PROJECT BOUNDARY (FENCE LINE)

FOR PERMIT APPLICATION

WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

Olin

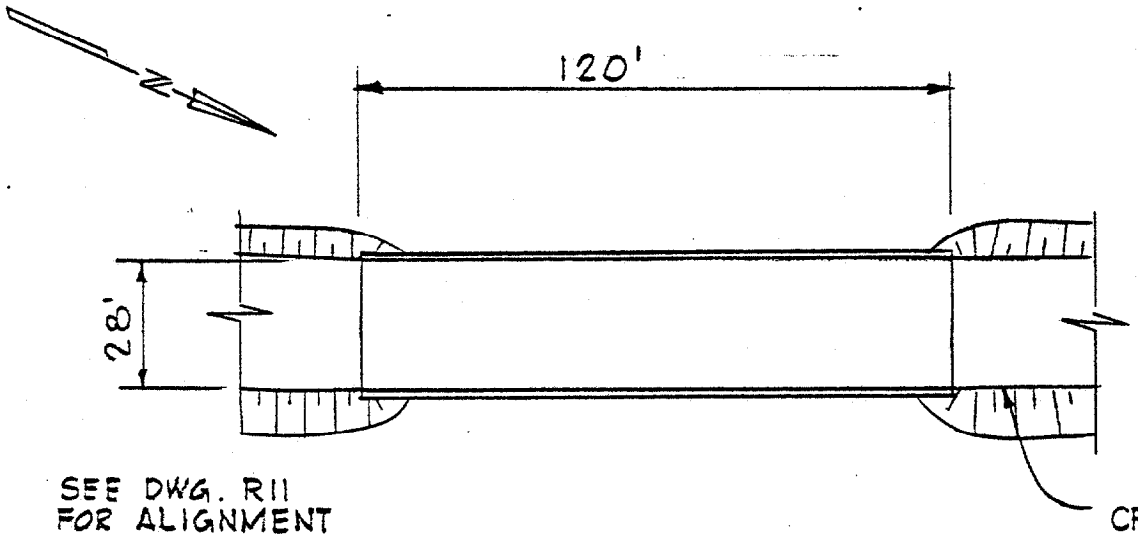
DRAWN BY S. V. N.	DATE 12-26-84	
CHECKED BY APO	DATE 2.1.85	
APP. BY	DATE	
APP. BY	DATE	

HUNTSVILLE, ALABAMA
REMEDIAL ACTION PLAN

CONSTRUCTION FEATURES 4 OF 4

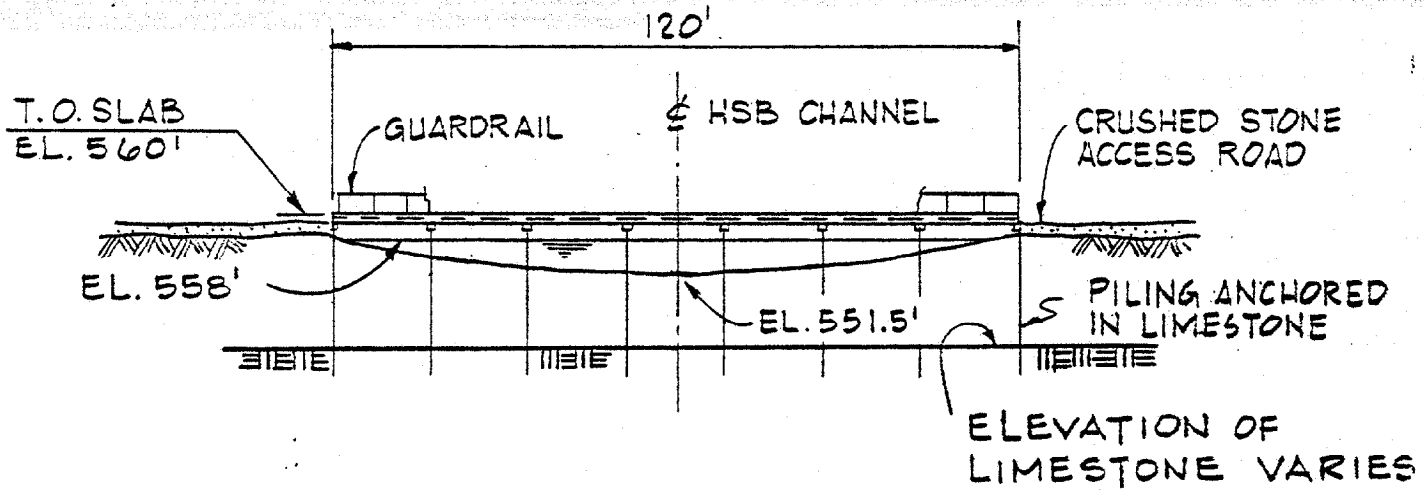
DWG. R5 OF 20

REV. P8



PLAN

SCALE : 1" = 40'



ELEVATION

SCALE : 1" = 40'

NOTE: BRIDGE DECK & GUARDRAILS TO BE REMOVED, PILE CAPS REMOVED AND PILES CUT OFF AT EXIST. GROUND LEVEL AT END OF PROJECT.

ELEVATIONS REFER TO N.G.V.D.-1929

FOR PERMIT APPLICATION

WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

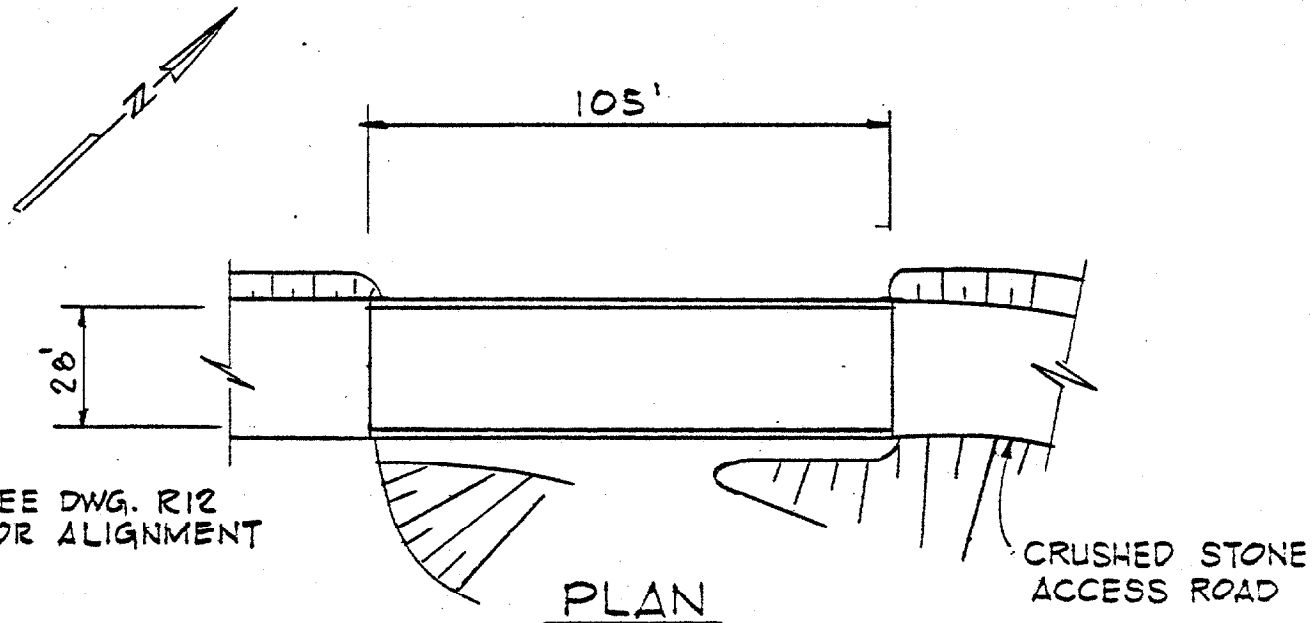
Olin

DRAWN BY S. V. N.	DATE 12-26-84	
CHECKED BY APO	DATE 2-1-85	
APP. BY	DATE	
APP. BY	DATE	

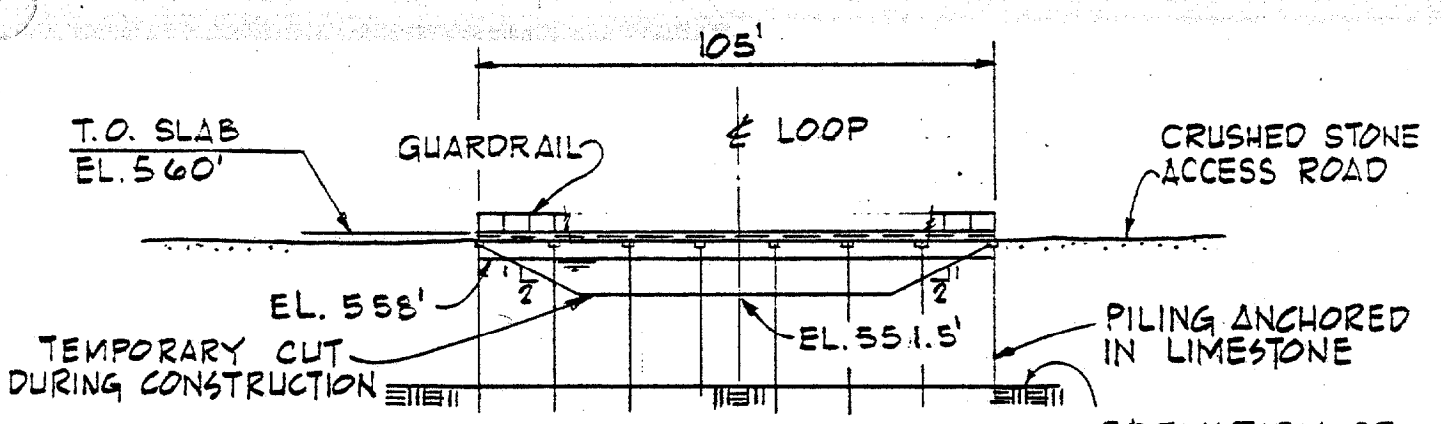
HUNTSVILLE, ALABAMA
REMEDIAL ACTION PLAN
BRIDGE NO. 1

DWG. R7 OF 20

REV. P3



PLAN
SCALE: 1"=40'



ELEVATION
SCALE: 1"=40'

NOTE:
BRIDGE DECK & GUARDRAIL TO BE REMOVED, PILE CAPS REMOVED AND PILES CUT OFF AT EXIST. GROUND LEVEL AT END OF PROJECT.

ELEVATIONS REFER TO N.G.V.D. - 1929

FOR PERMIT APPLICATION

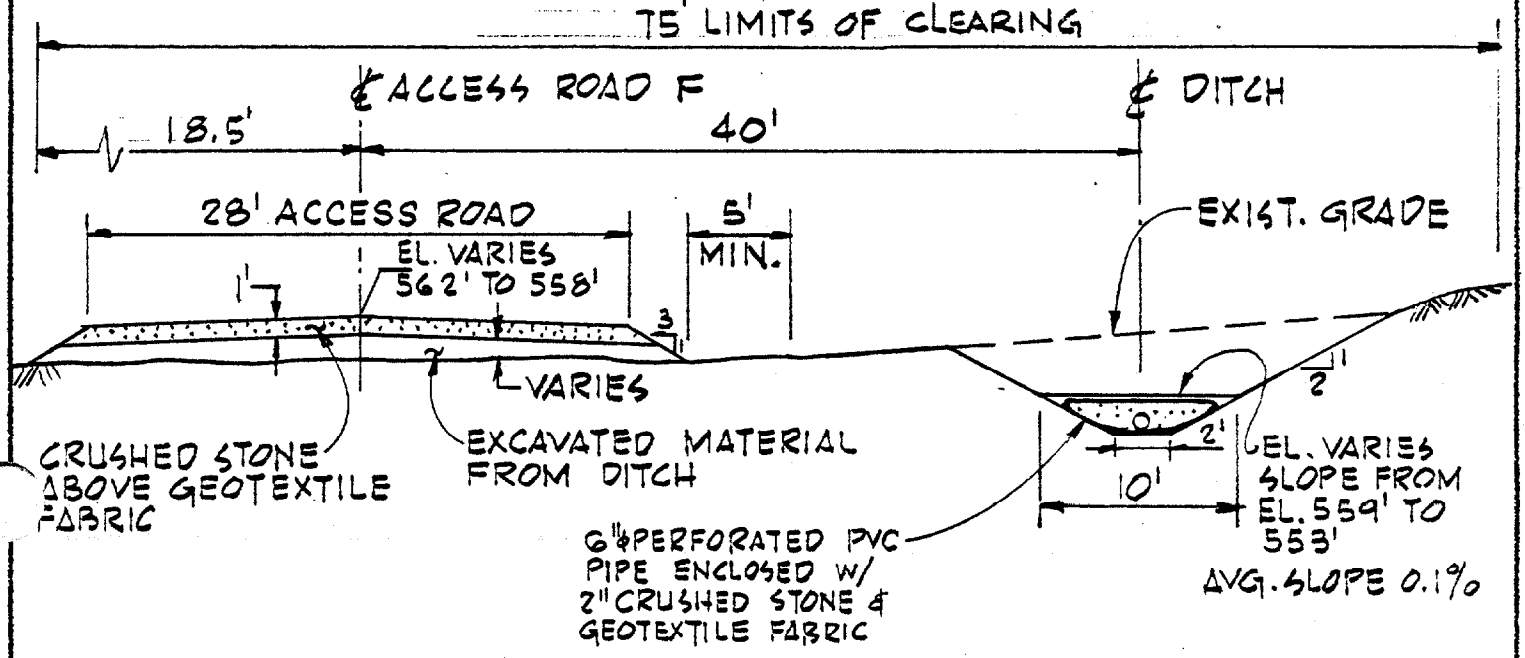
WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

Olin

DRAWN BY S. V. N.	DATE 12-26-84	
CHECKED BY A.P.O.	DATE 2-1-85	
APP. BY	DATE	
APP. BY	DATE	

HUNTSVILLE, ALABAMA
REMEDIAL ACTION PLAN
BRIDGE NO. 2

DWG. R8 OF 20 | REV. P2



SECTION G

SCALE: 1" = 10'

R5 R26 | R9

ELEVATIONS REFER TO N.G.V.D-1929

FOR PERMIT APPLICATION

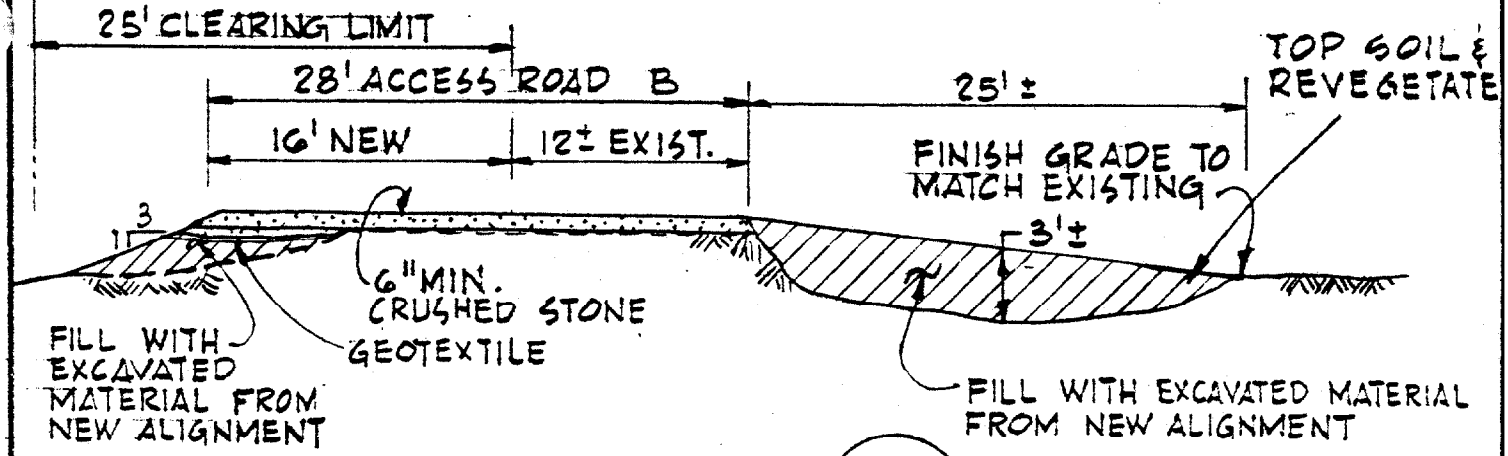
WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

Olin

DRAWN BY S.V.N.	DATE 12-26-85
CHECKED BY [illegible]	DATE 4.16.86
APP. BY	DATE
APP. BY	DATE

HUNTSVILLE, ALABAMA
REMEDIAL ACTION PLAN
NORTHERN DIVERSION DITCH

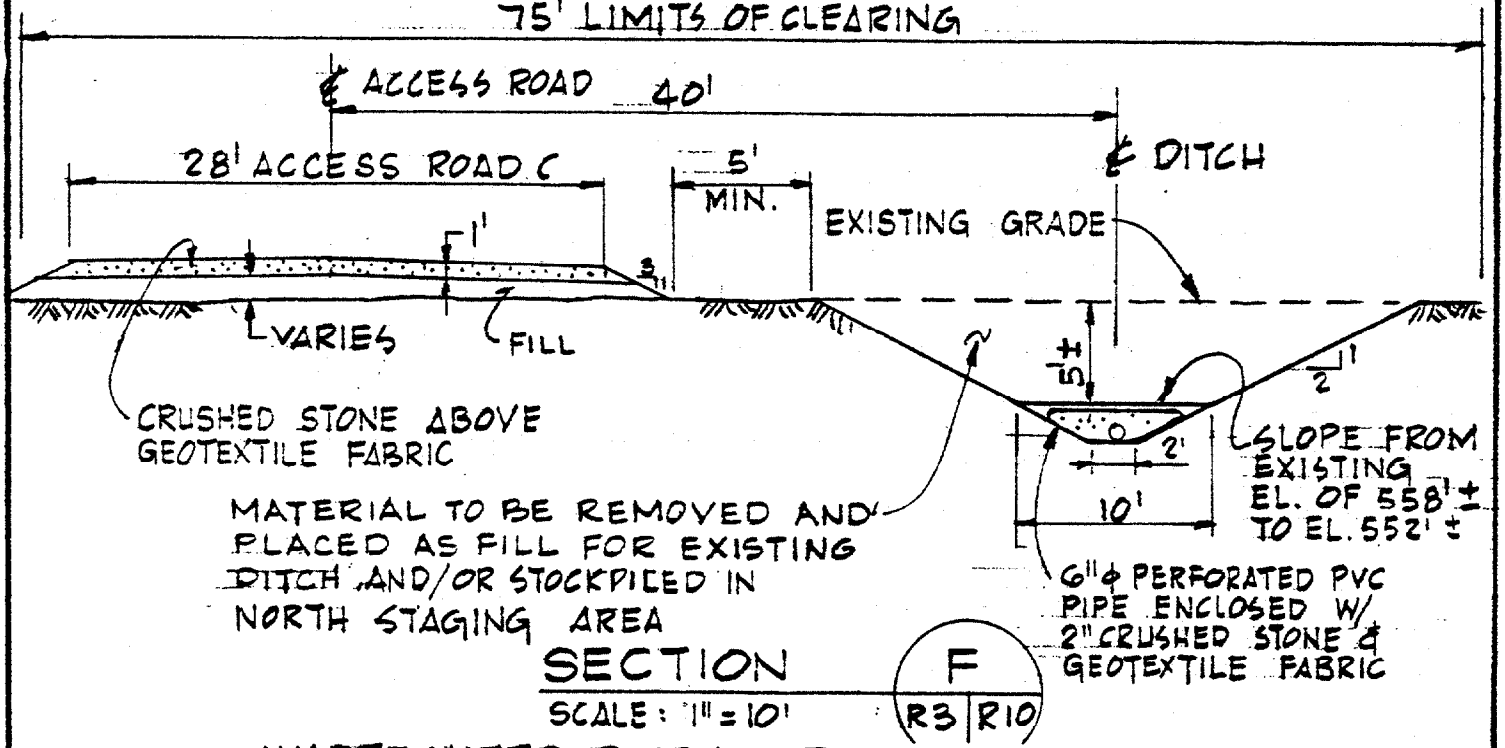
DWG. R9 OF 20 | REV. P3



SECTION E (R3 | R10)

EXISTING WASTEWATER DITCH

SCALE: 1" = 10'



SECTION F (R3 | R10)

SCALE: 1" = 10'

WASTEWATER DITCH - NEW ALIGNMENT

ELEVATIONS REFER TO N.G.V.D. - 1929

FOR PERMIT APPLICATION

Olin

HUNTSVILLE, ALABAMA

REMEDIAL ACTION PLAN

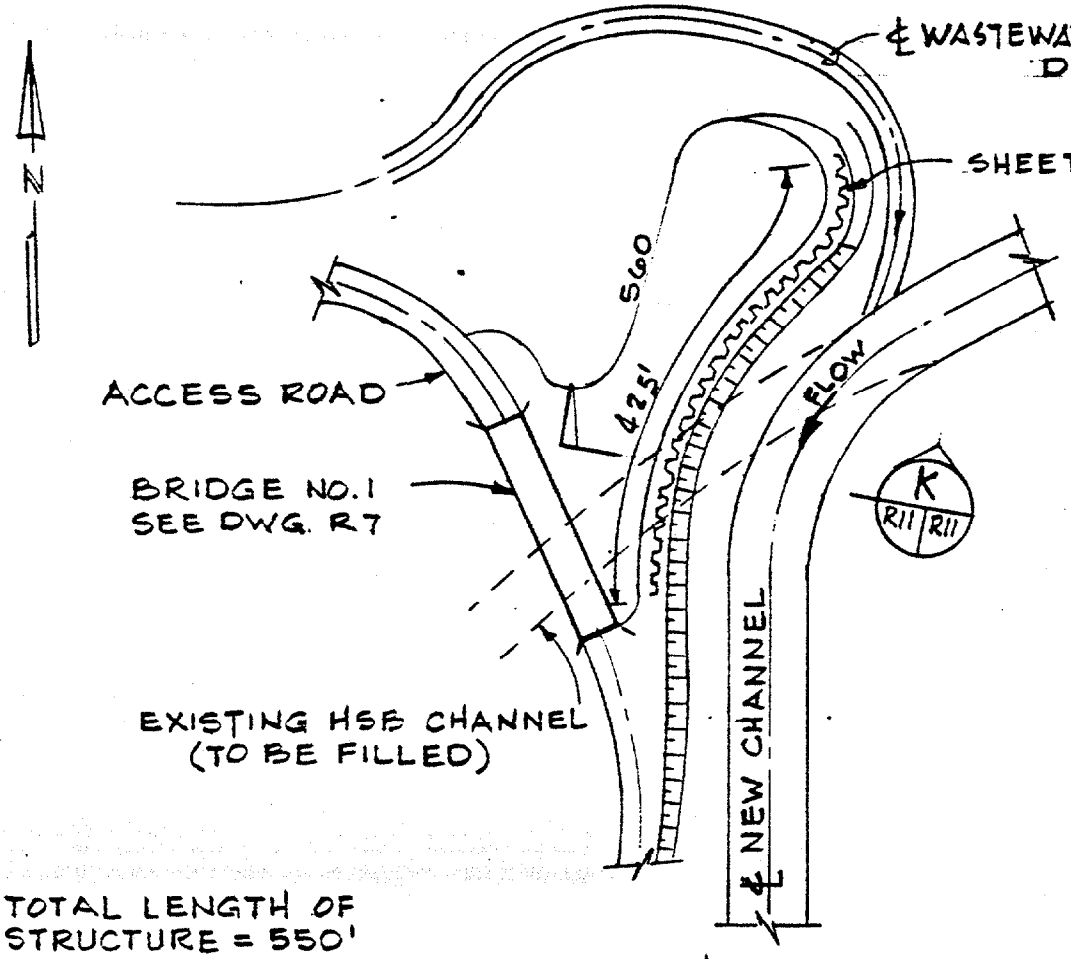
WASTEWATER DITCH SECTIONS

WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

DRAWN BY S. V. N.	DATE 12-26-84	
CHECKED BY APO	DATE 2-1-85	
APP. BY	DATE	
APP. BY	DATE	

DWG. R10 OF 20

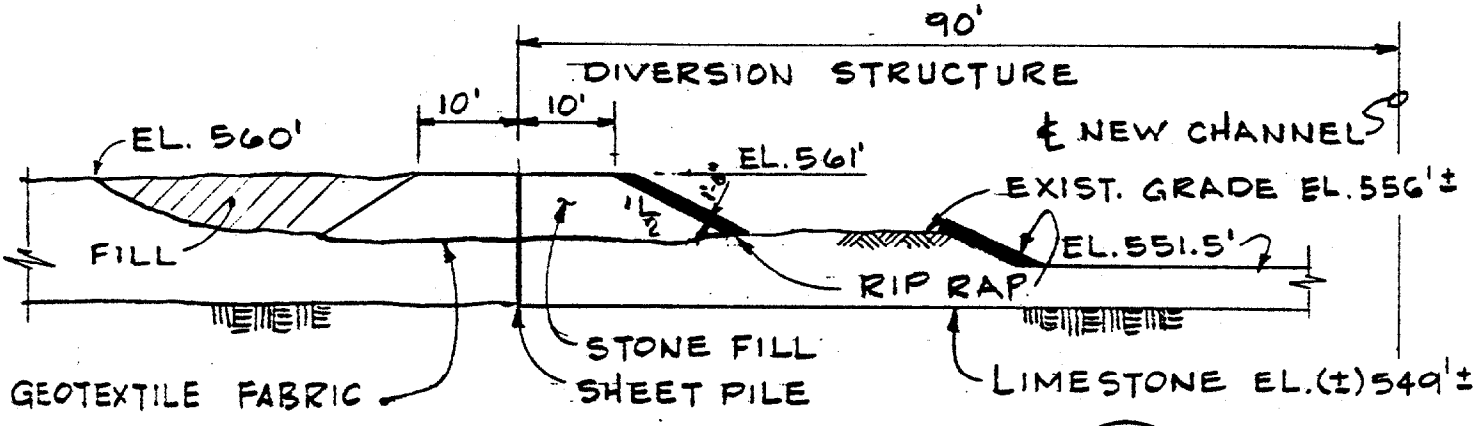
REV. P3



TOTAL LENGTH OF STRUCTURE = 550'

PLAN

N.T.S.



SECTION

SCALE : 1" = 20'

ELEVATIONS REFER TO N.G.V.D. - 1929

K
R11 R11

FOR PERMIT APPLICATION

Clin

HUNTSVILLE, ALABAMA
REMEDIAL ACTION PLAN

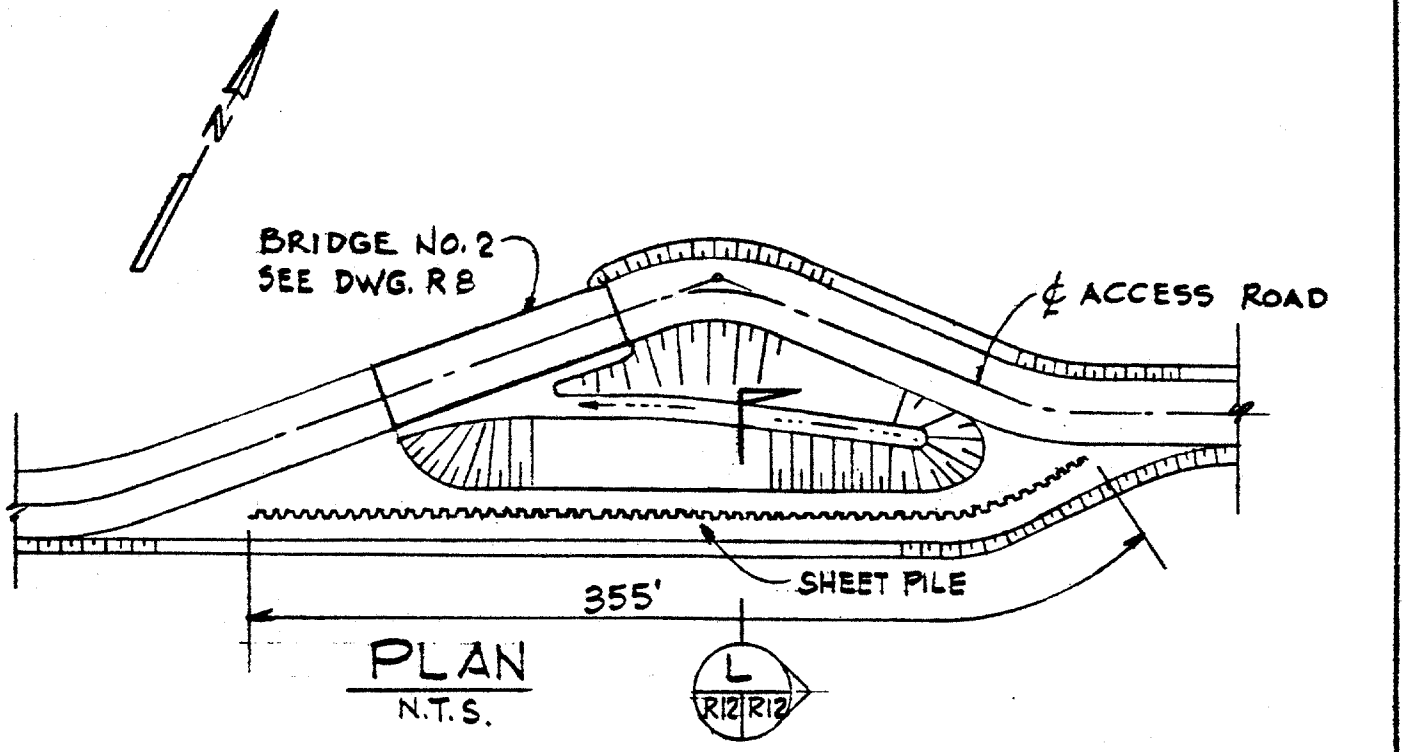
DIVERSION STRUCTURE NO.1

WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

DRAWN BY J F	DATE 4-16-85	
CHECKED BY ARO	DATE 4.18.85	
APP. BY	DATE	
APP. BY	DATE	

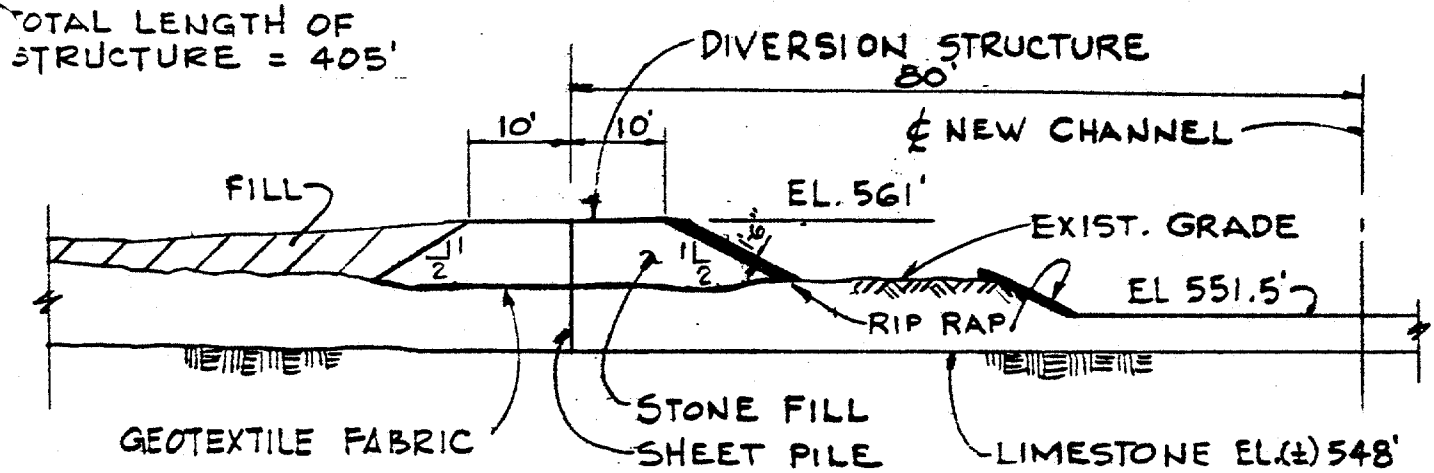
DWG. R11 OF 20

REV. P1



PLAN
N.T.S.

L
R12 | R12

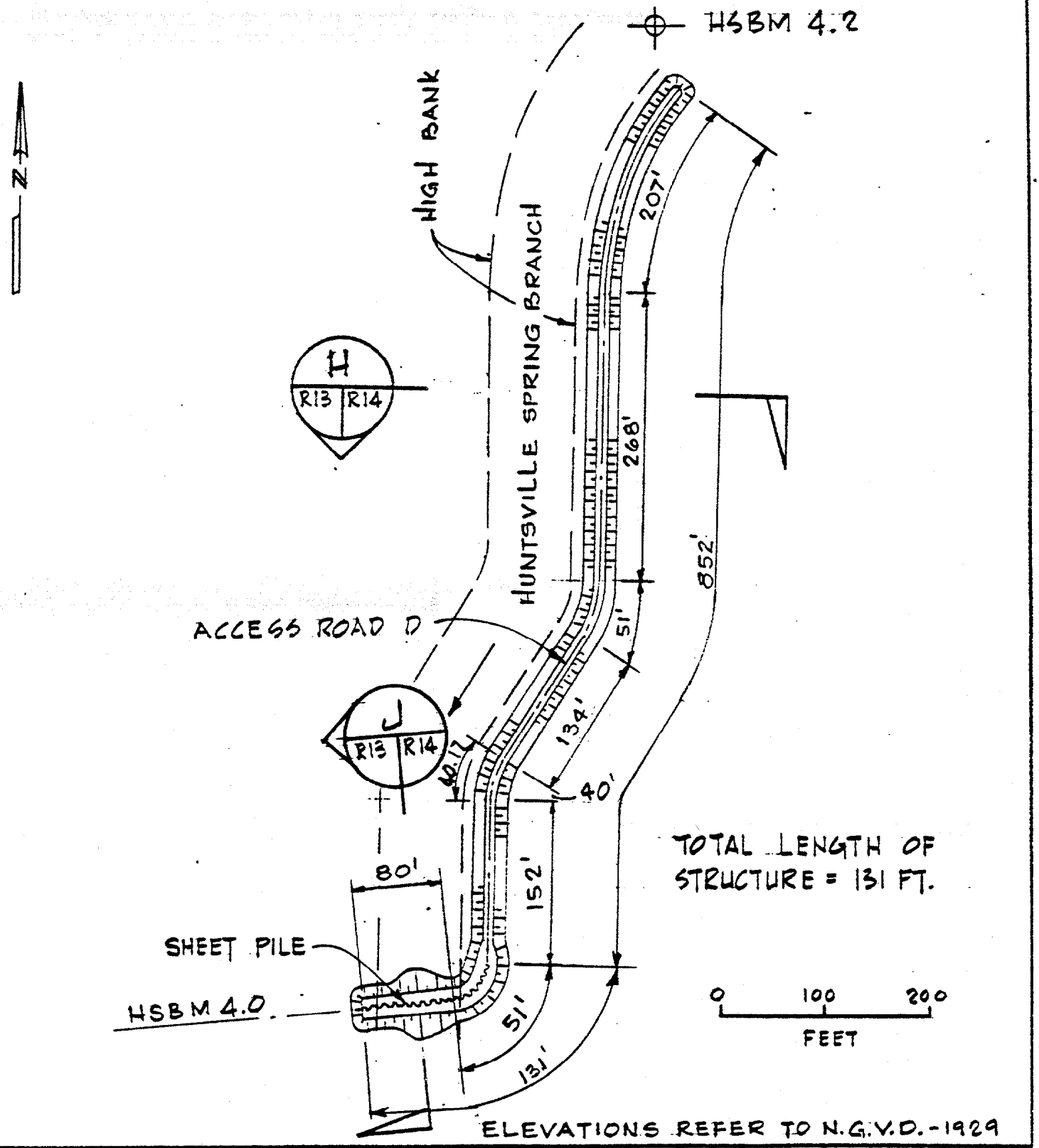


SECTION
SCALE: 1"= 20'

L
R12 | R12

ELEVATIONS REFER TO N.G.V.D-1929

OR PERMIT APPLICATION	Olin	HUNTSVILLE, ALABAMA REMEDIAL ACTION PLAN DIVERSION STRUCTURE NO.2	
WALDEMAR S. NELSON & CO., INC. NEW ORLEANS, LA. ENGINEERS AND ARCHITECTS	DRAWN BY C.H DATE 4-16-85 CHECKED BY ARO DATE 4.18.85 APP. BY DATE APP. BY DATE	DWG. R12 OF 20	REV. P1



FOR PERMIT APPLICATION

WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

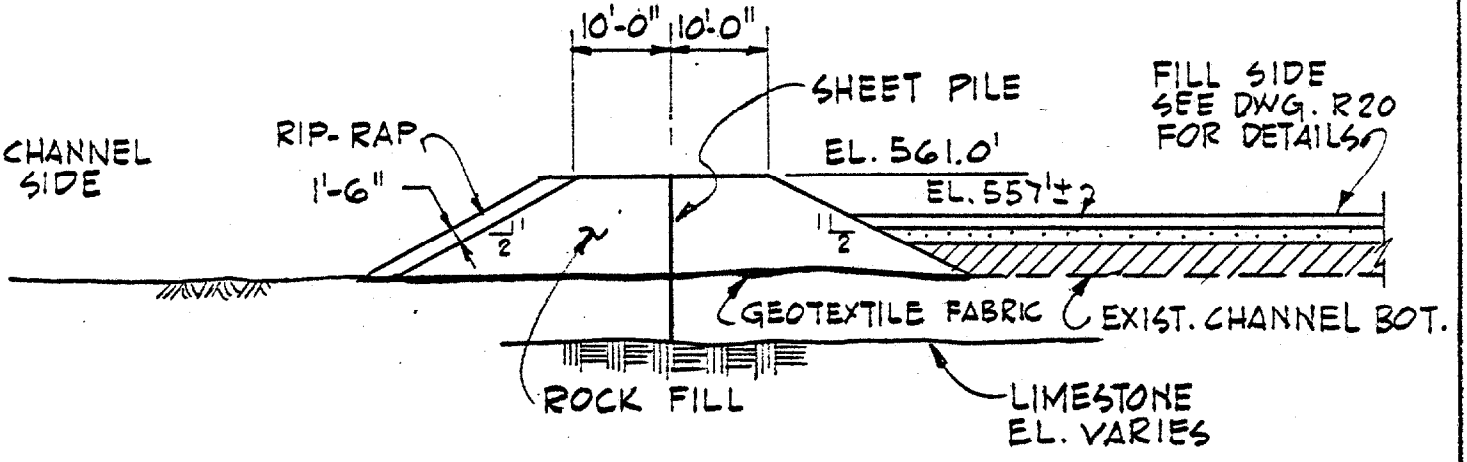
Olin

DRAWN BY J.F.	DATE 4-16-85	
CHECKED BY [illegible]	DATE 4-16-85	
APP. BY	DATE	
APP. BY	DATE	

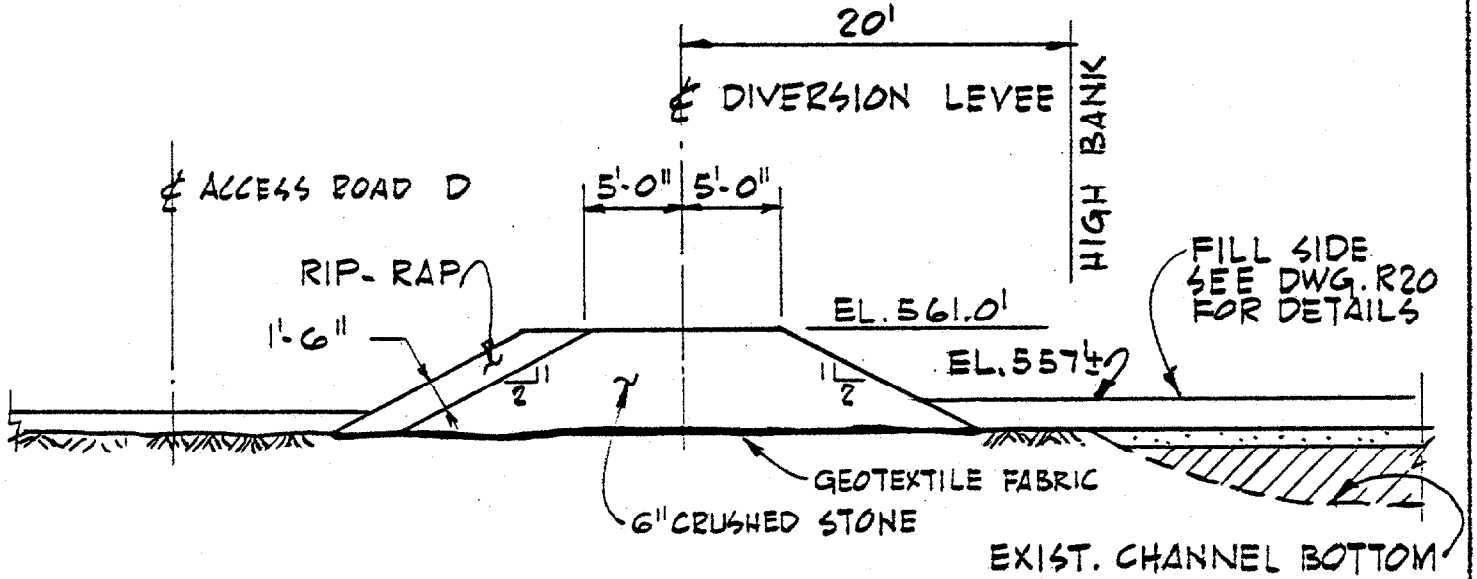
HUNTSVILLE, ALABAMA
REMEDIAL ACTION PLAN
DIVERSION STRUCTURE NO.3
& DIVERSION LEVEE

DWG. R13 OF 20

REV. P



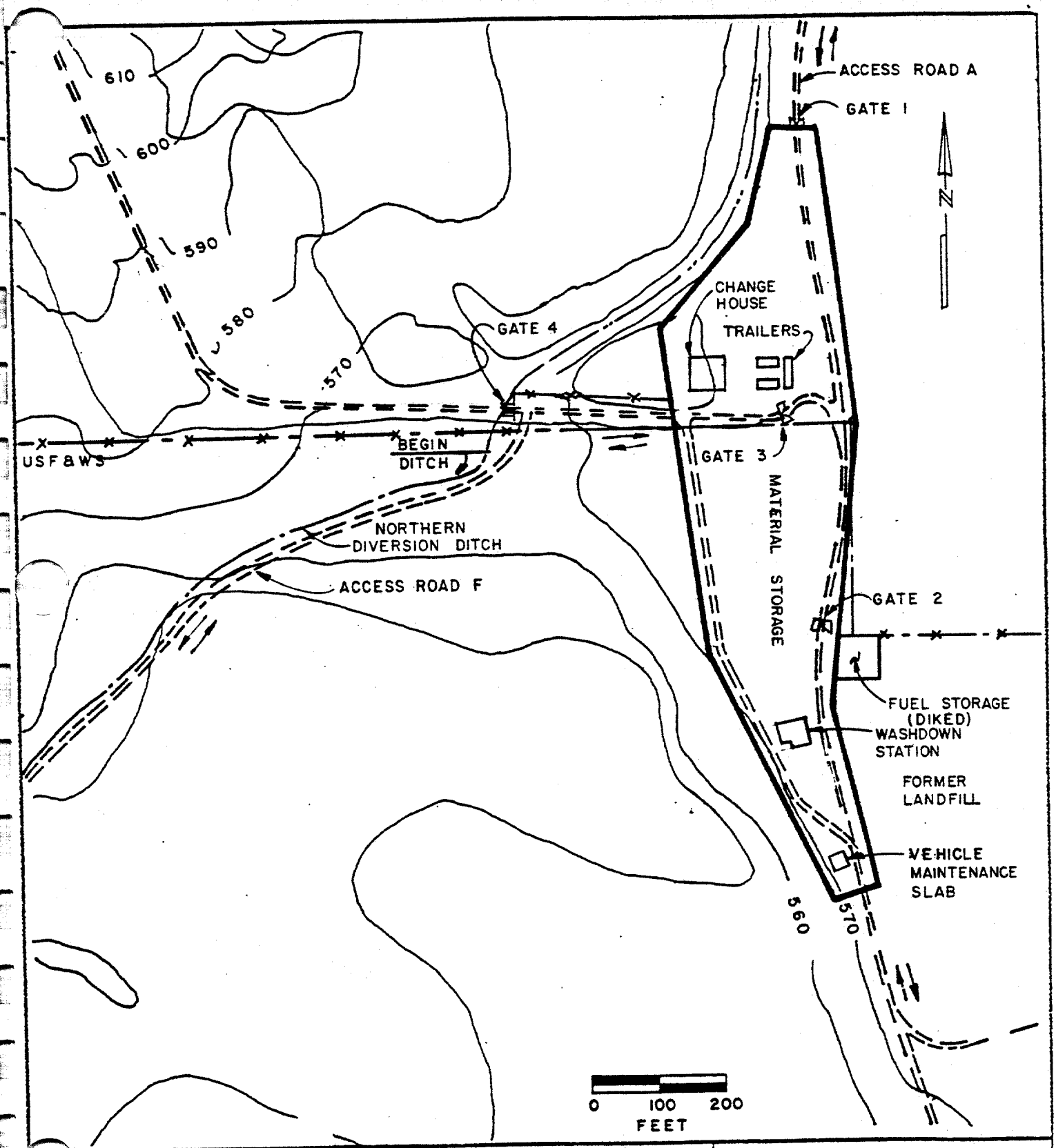
SECTION J
SCALE: 1" = 20'
R13 | R14



SECTION H
SCALE: 1" = 10'
R5 R13 | R14

ELEVATIONS REFER TO NGVD-1929

FOR PERMIT APPLICATION	Olin	HUNTSVILLE, ALABAMA REMEDIAL ACTION PLAN DIVERSION STRUCTURE NO.3 & DIVERSION LEVEE SECTIONS
WALDEMAR S. NELSON & CO., INC. NEW ORLEANS, LA. ENGINEERS AND ARCHITECTS	DRAWN BY S V N DATE 4-16-85 CHECKED BY APO DATE 4.16.85 APP. BY DATE APP. BY DATE	DWG. R14 OF 20 REV. P1



OR PERMIT APPLICATION

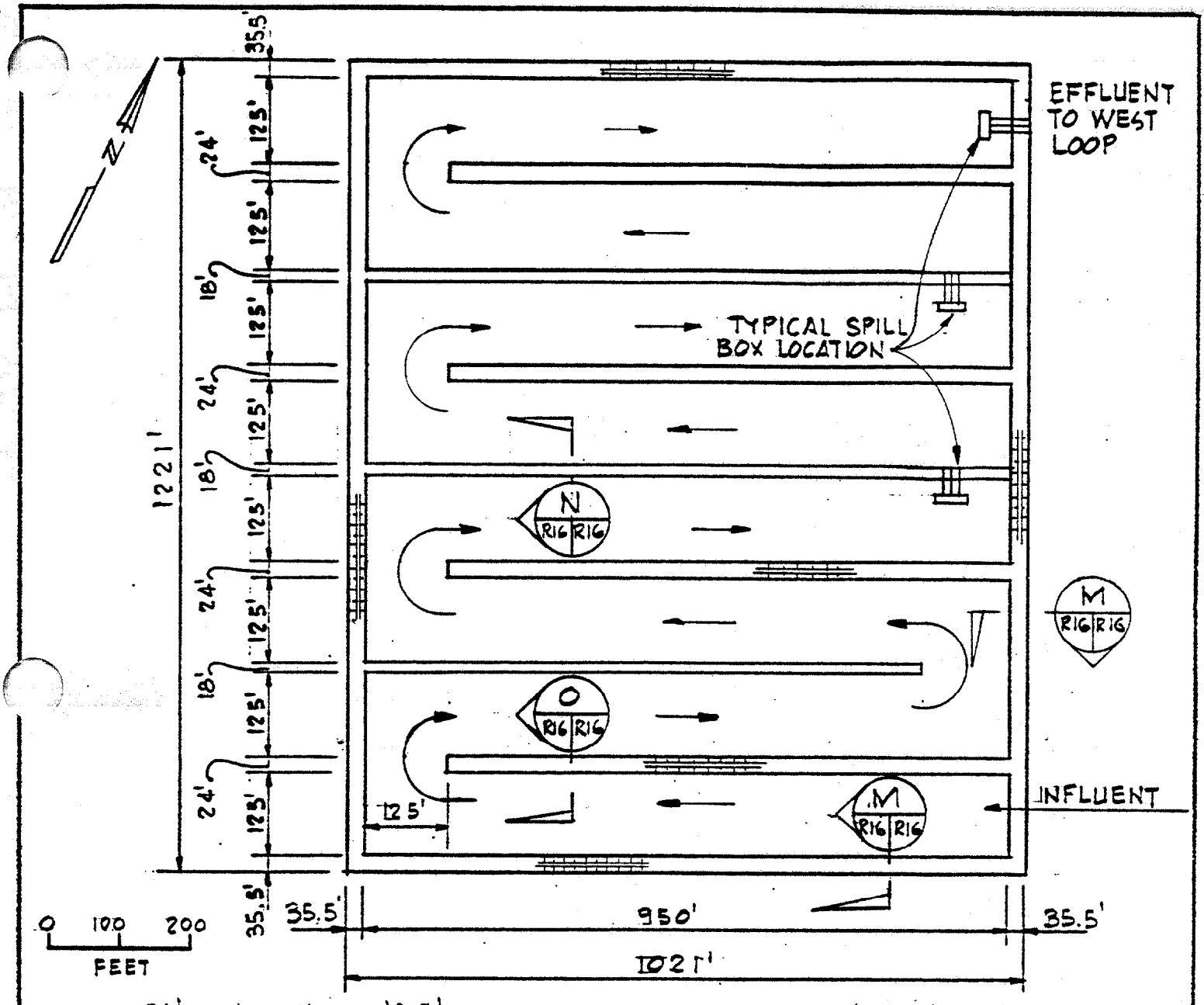
WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

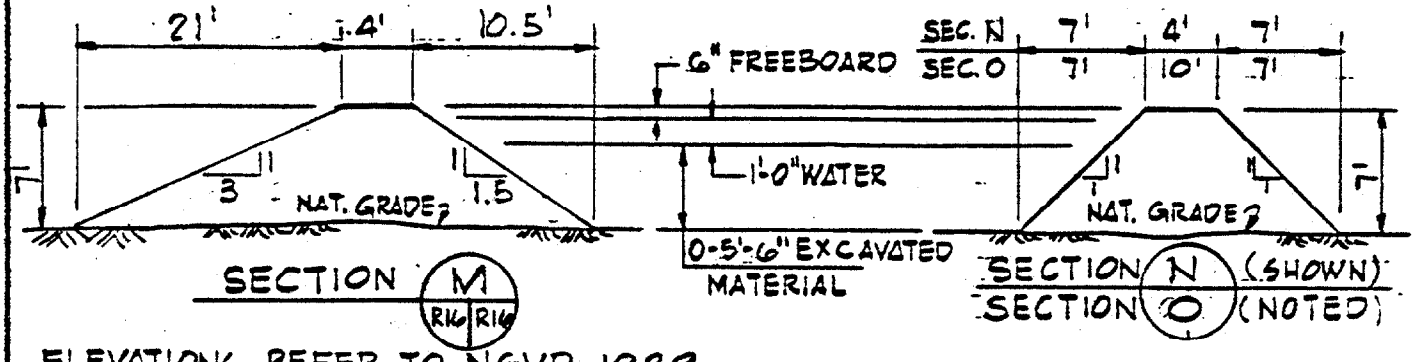
Olin

DRAWN BY J. F.	DATE 4-16-85
CHECKED BY [illegible]	DATE 4.16.85
APP. BY	DATE
APP. BY	DATE

HUNTSVILLE, ALABAMA
REMEDIAL ACTION PLAN
NORTH STAGING AREA

DWG. R15 OF 20 | REV. P1





ELEVATIONS REFER TO NGVD-1929

FOR PERMIT APPLICATION

WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

Olin

HUNTSVILLE, ALABAMA

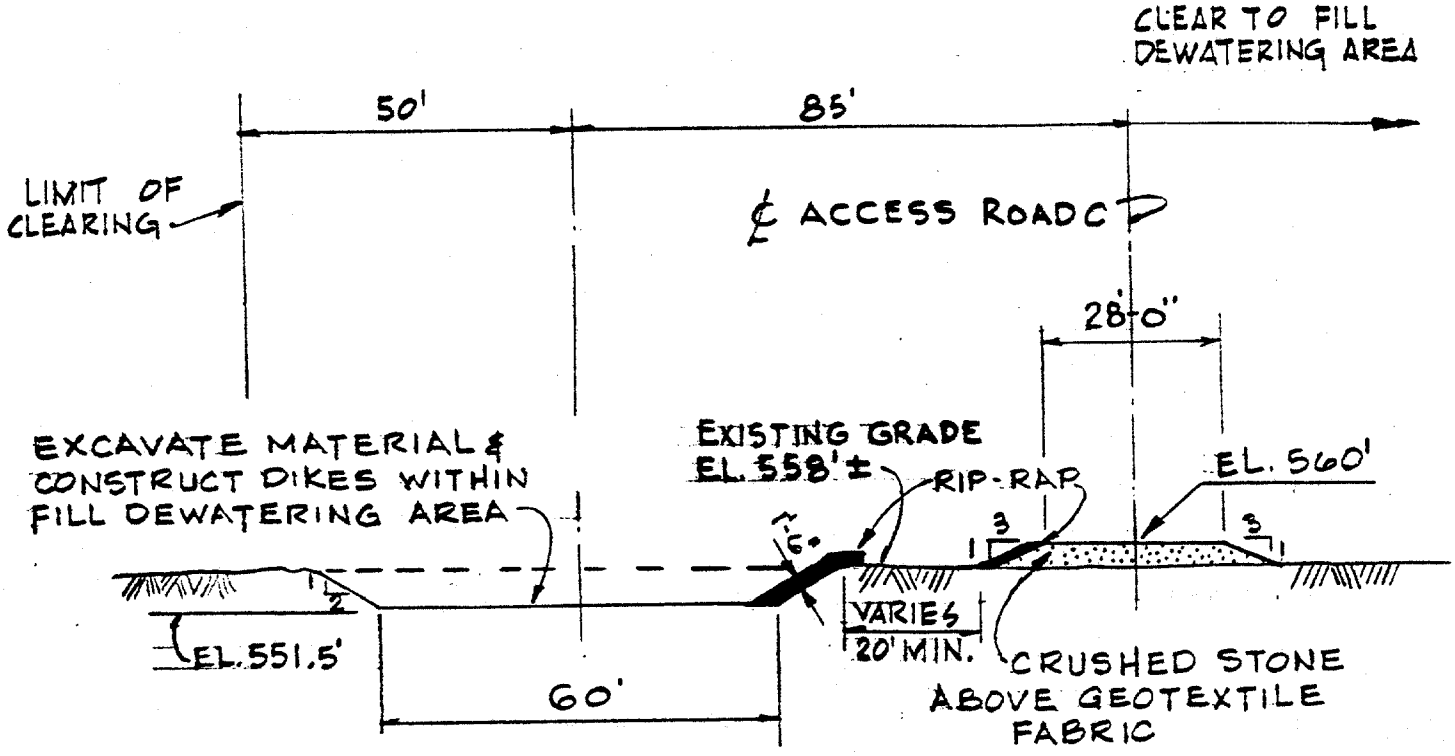
REMEDIAL ACTION PLAN

FILL DEWATERING AREA

DRAWN BY S. V. N.	DATE 4-16-85	
CHECKED BY RPO	DATE 4.16.85	
APP. BY	DATE	
APP. BY	DATE	

DWG. R16 OF 20

REV. P11



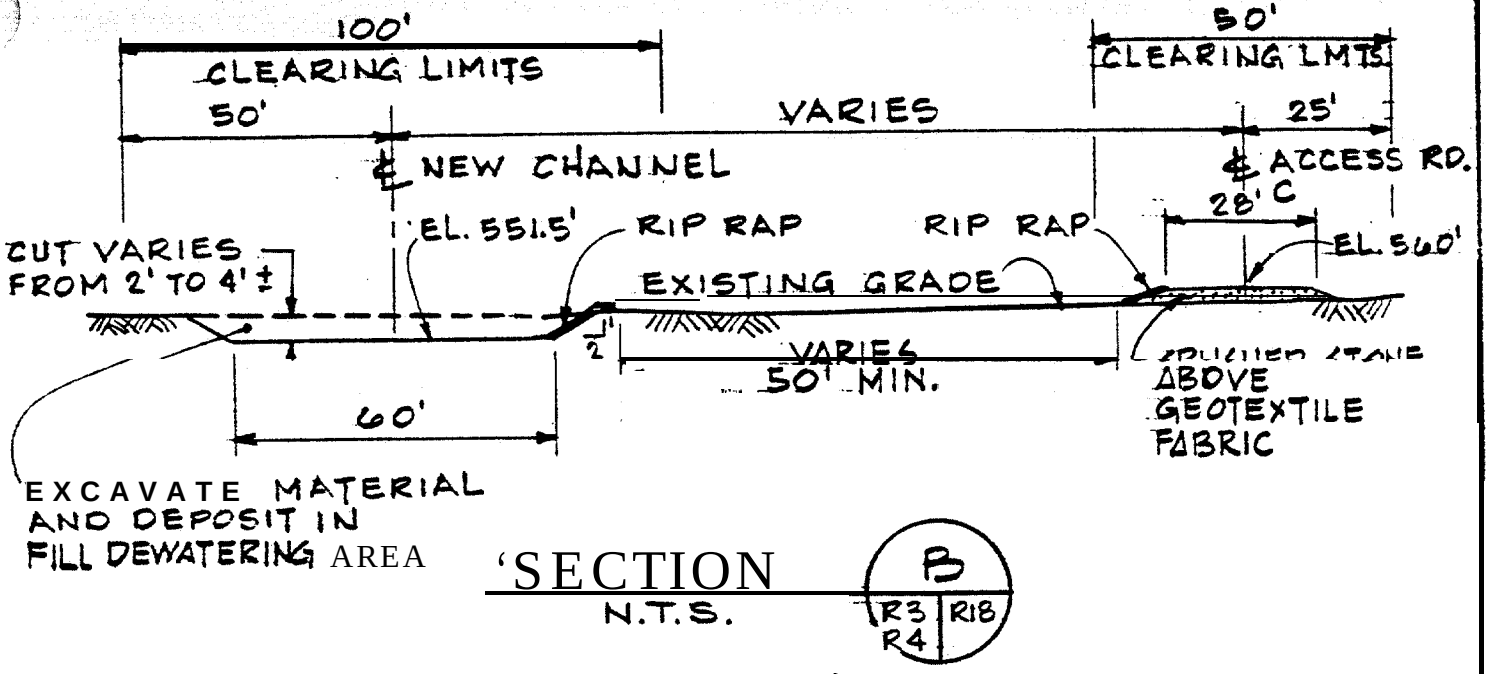
SECTION D

SCALE: 1"=30'

R4 | R17

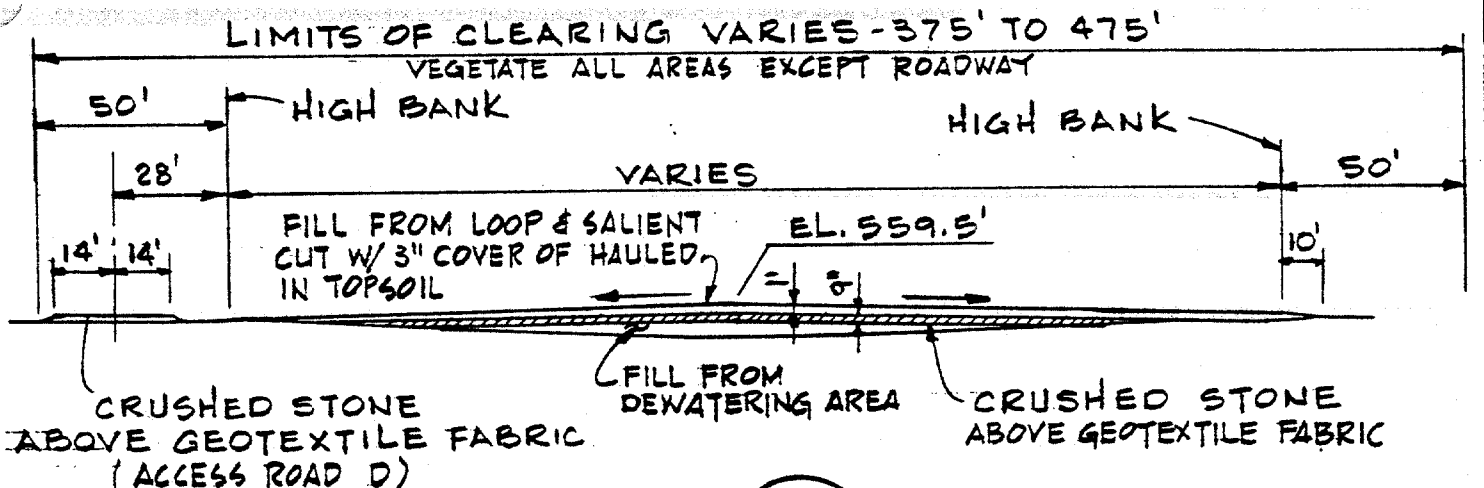
ELEVATIONS REFER TO N.G.V.D.-1929

FOR PERMIT APPLICATION	Olin	HUNTSVILLE, ALABAMA REMEDIAL ACTION PLAN SALIENT CUT SECTION
WALDEMAR S. NELSON & CO., INC. NEW ORLEANS, LA. ENGINEERS AND ARCHITECTS	DRAWN BY S. V. N. DATE 12-26-84 CHECKED BY APO DATE 2-1-85 APP. BY DATE APP. BY DATE	DWG. R17 OF 20 REV. P1



SECTION B
N.T.S.
R3 R4 | R18

LOOP: NEW CHANNEL



SECTION C
SCALE: 1" = 50'
R4 | R18

LOOP: WEST CHANNEL

ELEVATIONS REFER TO N.G.V.D. - 1929

FOR PERMIT APPLICATION

WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

Olin

DRAWN BY J. F.	DATE 4/16/85	
CHECKED BY RDD	DATE 4-18-85	
APP. BY	DATE	
APP. BY	DATE	

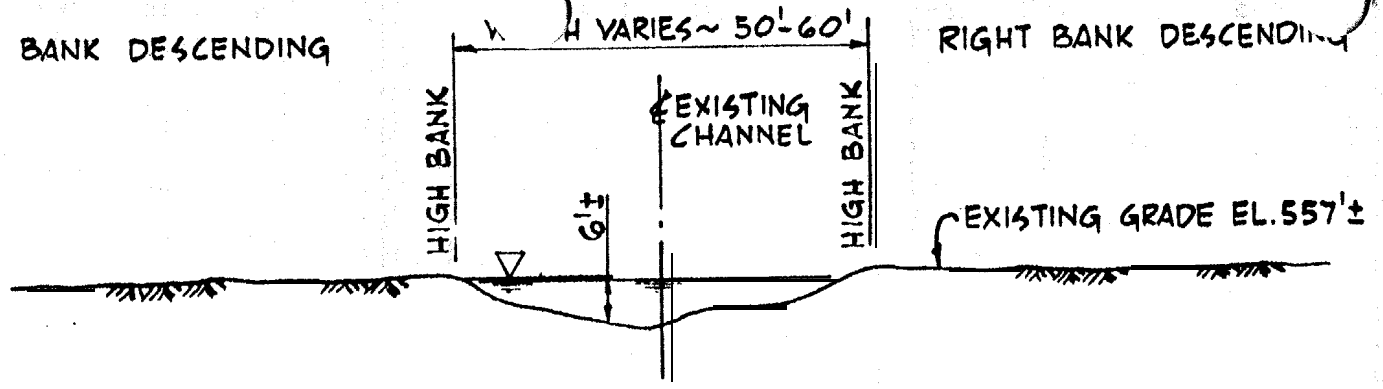
HUNTSVILLE, ALABAMA
REMEDIAL ACTION PLAN
LOOP
SECTIONS

DWG. R18 OF 20 | REV. P1

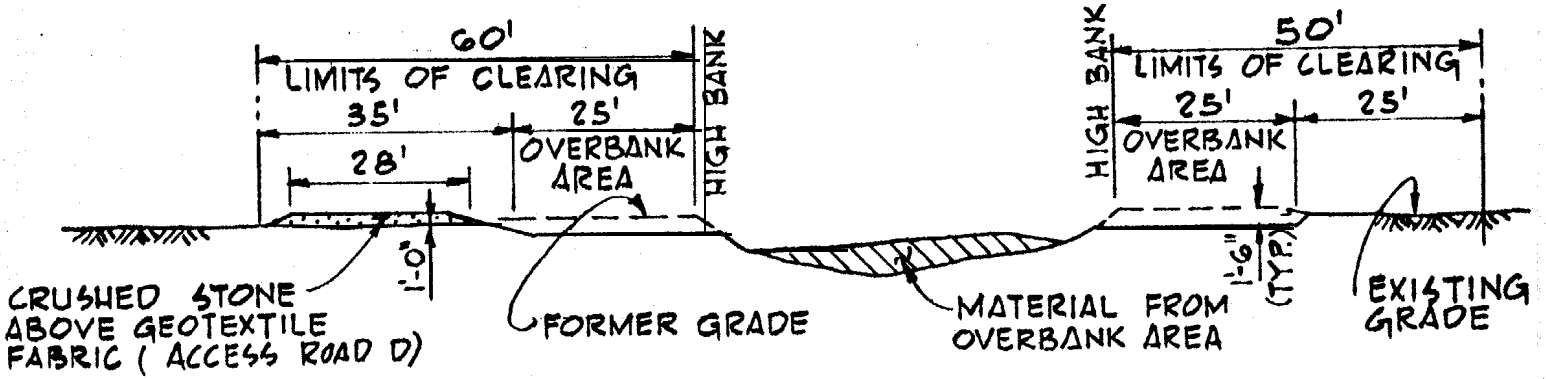
WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

PERMIT APPLICATION

ELEVATIONS REFER TO NGVD-1929



SECTION A EXISTING CONDITION
N.T.S.
R3 R5 R6 R19



SECTION CHANNEL FILL
N.T.S.

CONSTRUCTION SEQUENCE

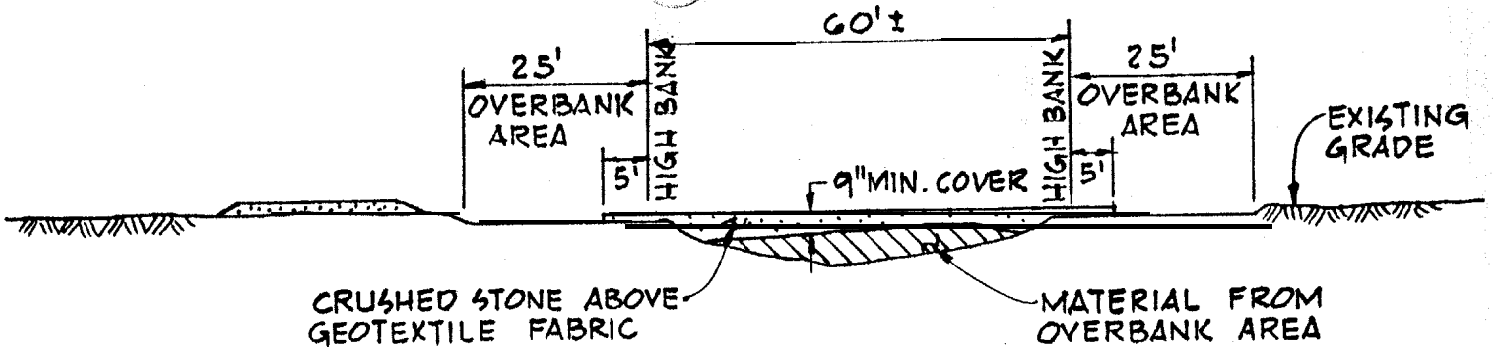
1. CLEAR & GRUB TO CONSTRUCTION LIMITS
2. CONSTRUCT 28' WIDE ACCESS ROAD ON LEFT BANK
3. DEWATER CHANNEL IN SECTIONS
4. EXCAVATE UPPER 1'-6" OF MATERIAL IN OVERBANK AREAS & DEPOSIT IN CHANNEL

DRAWN BY S.V.N. DATE 4-16-85
CHECKED BY [illegible] DATE
APP. BY DATE
APP. BY DATE

Olin

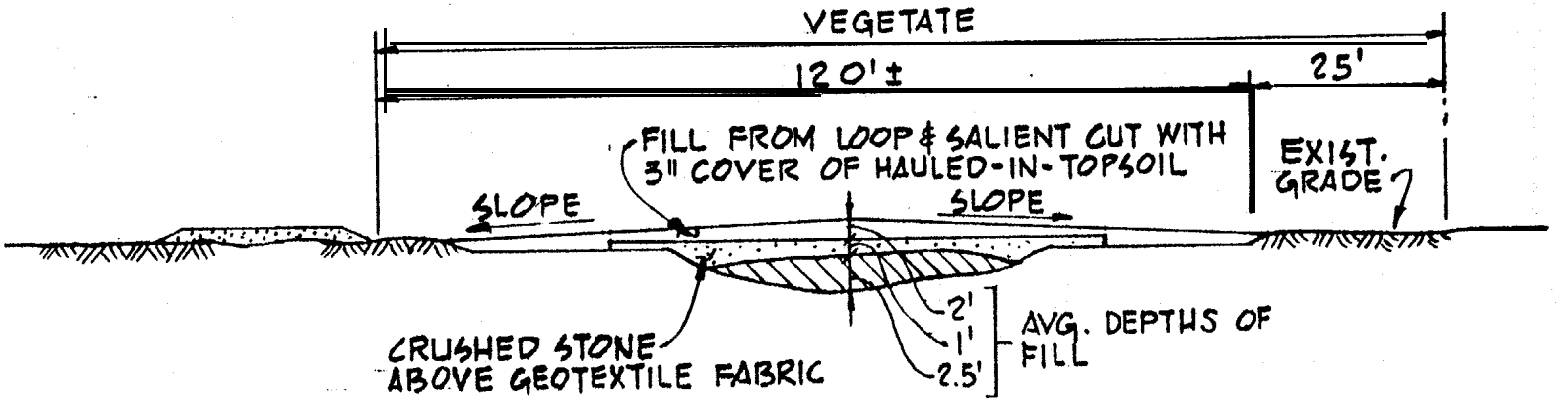
HUNTSVILLE, ALABAMA
REMEDIAL ACTION PLAN
CHANNEL FILL SEQUENCE

DWG. R19 OF 20 REV. P
SH. 1 OF 2



SECTION CHANNEL FILL

N.T.S.



SECTION CHANNEL FILL

N.T.S.

CONSTRUCTION SEQUENCE

5. LAY GEOTEXTILE FABRIC ABOVE MATERIAL FROM OVERBANK AREA
6. HAUL IN CRUSHED STONE FILL & DEPOSIT ABOVE OVERBANK MATERIAL
7. HAUL EXCAVATED MATERIAL FROM DEWATERING AREA & DEPOSIT ABOVE STONE FILL
8. HAUL IN TOPSOIL & DEPOSIT 3" MIN. LIFT ABOVE EXCAVATED MATERIAL
9. REVEGETATE ENTIRE AREA

ELEVATIONS REFER TO NGVD-1929

FOR PERMIT APPLICATION

WALDEMAR S. NELSON & CO., INC.
NEW ORLEANS, LA.
ENGINEERS AND ARCHITECTS

Olin

DRAWN BY S.V.N. DATE 4-16-85
CHECKED BY [illegible] DATE [illegible]
APP. BY DATE
APP. BY DATE

HUNTSVILLE, ALABAMA
REMEDIAL ACTION PLAN
CHANNEL FILL SEQUENCE

DWG. R20 OF 20 REV. P1

SH.2 OF 2